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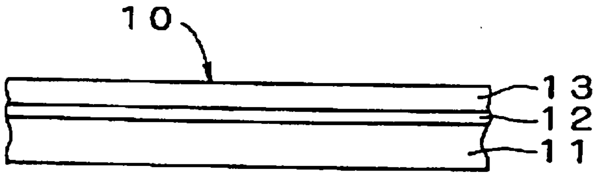
最終頁に続く

(54)【発明の名称】　研磨テープ、その製造方法および研磨テープ用塗工剤

(57)【要約】

【課題】　光コネクタフェルールや半導体ウエハ等の精密部品表面等の最終仕上げを行うのに好適な研磨テープおよびその製造方法を提供する。

【解決手段】　研磨テープ用基材１１上に、必要ならばプライマ層１２を介して、平均粒子径１～２００ｍμの研磨材粒子を結合剤用樹脂液中に分散させた塗工剤を塗布して研磨層１３を形成し、このようにして研磨テープ１０を得る。



【特許請求の範囲】

【請求項１】研磨テープ用基材に対して、平均粒子径１０〜１００ｍμの研磨材粒子を結合剤用樹脂液中に分散させた塗工剤により研磨層を形成したことを特徴とする研磨テープ。

【請求項２】結合剤用樹脂液は、シリコーン樹脂またはシリコーン系樹脂を有することを特徴とする請求項１記載の研磨テープ。

【請求項３】研磨材粒子はシリカ粒子であることを特徴とする請求項１または２のいずれか記載の研磨テープ。

【請求項４】研磨層中の研磨材粒子の粒子径は５０〜８００ｍμであることを特徴とする請求項１、２または３のいずれか記載の研磨テープ。

【請求項５】平均粒子径１０〜１００ｍμの研磨材粒子を結合剤用樹脂液中に分散させた後、結合剤用樹脂液中で研磨材粒子の凝集物を生成させ、粒子径１００〜８００ｍμの研磨材粒子を含有する塗工剤とし、次いでこれを研磨テープ用基材に塗工することを特徴とする研磨テープの製造方法。

【請求項６】結合剤用樹脂液は、シリコーン樹脂またはシリコーン系樹脂を有することを特徴とする請求項５記載の研磨テープの製造方法。

【請求項７】研磨材粒子がシリカ粒子である請求項５または６のいずれか記載の研磨テープの製造方法。

【請求項８】研磨テープ用基材と、
この基材上に設けられた研磨層とを備え、
前記研磨層は平均粒子径１〜２００ｍμの研磨材粒子と、この研磨材粒子を結合する結合剤とを有することを特徴とする研磨テープ。

【請求項９】研磨材粒子はシリカ粒子であることを特徴とする請求項８記載の研磨テープ。

【請求項１０】結合剤はシロキサン結合を有する結合剤であることを特徴とする請求項８または９のいずれか記載の研磨テープ。

【請求項１１】研磨層の全光線透過率は６０〜９５％であり、ヘイズ値は１〜７０％であることを特徴とする請求項８、９または１０のいずれか記載の研磨テープ。

【請求項１２】研磨テープ用基材と研磨層との間に、プライマ層を設けたことを特徴とする請求項８、９、１０または１１のいずれか記載の研磨テープ。

【請求項１３】研磨テープ製造用の塗工剤において、
平均粒子径１〜２００ｍμの研磨材粒子と研磨材粒子用溶媒とを含んだ研磨材粒子液と、結合剤と結合剤用溶媒とを含んだ結合剤用樹脂液とを備えたことを特徴とする塗工剤。

【請求項１４】塗工剤中における研磨材粒子と結合剤との重量比は、２０：８０〜９５：５であることを特徴とする請求項１３記載の塗工剤。

【請求項１５】結合剤を硬化させるための硬化剤を更に備えたことを特徴とする請求項１３または１４のいずれか記載の塗工剤。

【請求項１６】研磨材粒子を分散させるための分散剤を更に備えたことを特徴とする請求項１３，１４または１５のいずれか記載の塗工剤。

【請求項１７】研磨テープ用基材を準備する工程と、
平均粒子径１〜２００ｍμの研磨材粒子と研磨材粒子用溶媒とを含んだ研磨材粒子液と、結合剤と結合剤用溶媒とを含んだ結合剤用樹脂液とを混合して塗工剤を作製する工程と、
研磨テープ用基材上に塗工剤を塗布する工程と、
塗布された塗工剤を乾燥する工程と、を備えたことを特徴とする研磨テープの製造方法。

【請求項１８】研磨材粒子はシリカ粒子であることを特徴とする請求項１７記載の研磨テープの製造方法。

【請求項１９】結合剤はシロキサン結合を有する結合剤であることを特徴とする請求項１７または１８のいずれか記載の研磨テープの製造方法。

【請求項２０】塗工剤を塗布する工程は、グラビアリバース法により行われることを特徴とする請求項１７，１８または１９のいずれか記載の研磨テープの製造方法。

【請求項２１】塗工剤の乾燥工程は、塗布剤を塗布した後直ちに塗布剤を加熱して、塗布剤中の研磨材粒子用溶剤および結合剤用溶剤を飛散させる工程を有することを特徴とする請求項１７，１８，１９または２０のいずれか記載の研磨テープの製造方法。

【請求項２２】研磨テープ用基材上の塗工剤塗布面に、予めプライマ層を形成する工程を備えたことを特徴とする請求項１７，１８，１９，２０または２１のいずれか記載の研磨テープの製造方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、光コネクタフェルール、半導体ウエハ、金属、セラミックス、カラーフィルター（液晶表示用等）、プラズマディスプレイ、光学レンズ、磁気ディスクあるいは光ディスク基板、磁気ヘッド、光学読取ヘッド等の精密部品の表面、端面等に対する最終仕上げを行うのに好適な研磨テープ、その製造方法および研磨テープ用塗工剤に関する。

【０００２】

【従来の技術】光コネクタフェルールや半導体ウエハ等の精密部品は、最終仕上げを行う研磨工程での精度により、その品質が左右され、最終仕上げ研磨には、メカニカルポリッシングと呼ばれている研磨が行われている。

【０００３】このメカニカルポリッシングは、次のように行われる。すなわち、まず苛性ソーダ、アンモニア、エタノールアミン等のアルカリ溶液に、５〜３００ｍμの粒子径を有する研磨材粒子を懸濁させてｐＨ９〜１２のコロイダル液からなる研磨液を作製する。次にこの研磨液をポリウレタン等の樹脂シートからなる研磨布上に供給しながら、研磨布上で光コネクタフェルールや半導

体ウエハ等の精密部品を研磨している。

【０００４】

【発明が解決しようとする課題】上記のような研磨液と研磨布とを利用するメカニカルポリッシングには、以下のような問題がある。

【０００５】すなわち、研磨中に研磨液中の研磨材粒子の濃度が変化したり、あるいは研磨材粒子の凝集によって研磨材粒子の粒度分布が変化したりするため、光コネクタフェルール、半導体ウエハ等の被研磨体に研磨傷や研磨斑が発生することがある。また研磨終了後に光コネクタフェルール、半導体ウエハ等の被研磨体の表面に付着している研磨材粒子を水洗、除去する工程が必要であり、研磨工程が煩雑である。

【０００６】これに対して、プラスチックフィルムからなる研磨テープ用基材に対して、結合剤（バインダ）用樹脂液中に研磨材粒子を分散させてなる塗工剤を塗工、乾燥することによって研磨層を形成して研磨テープを作製することが考えられている。光コネクタフェルールおよび半導体ウエハ等はこの研磨テープ上で研磨されるが、研磨テープを作製する際、粒子径１μ以下の研磨材粒子をバインダ用樹脂液中に均一に分散させることはむずかしく、最終仕上げ用の研磨テープとしては使用することができない。

【０００７】すなわち、最終仕上げの高精度研磨は、微細な研磨材粒子による研磨によって行われるが、研磨材粒子は粒子径が小さくなるにしたがって表面エネルギーが増大して凝集し易くなるため、微細な研磨材粒子を結合剤中に均一に分散させることはむずかしい。

【０００８】また凝集状態の研磨材粒子を含有する塗工剤によって研磨層を形成した場合、研磨層中に５～１０μの粗大粒子が生成しており、これによる被研磨体表面の研磨傷の発生が避けられない。

【０００９】本発明はこのような点を考慮してなされたものであり、研磨層中に粗大粒子からなる研磨材粒子が存在することなく、微細な研磨材粒子のみを存在させて、光コネクタフェルール端面や、半導体ウエハ表面等の精密部品鏡面仕上げを精度良く行うことができる研磨テープ、その製造方法および研磨テープ用塗工剤を提供することを目的とする。

【００１０】

【課題を解決するための手段】請求項１記載の発明は、研磨テープ用基材に対して、平均粒子径１０～１００mμの研磨材粒子を結合剤用樹脂液中に分散させた塗工剤により研磨層を形成したことを特徴とする研磨テープである。

【００１１】請求項５記載の発明は、平均粒子径１０～１００mμの研磨材粒子を結合剤用樹脂液中に分散させた後、結合剤樹脂液中で研磨材粒子の凝集物を生成させ、粒子径１００～８００mμの研磨材粒子を含有する塗工剤とし、次いでこれを研磨テープ用基材に塗工することを特徴とする研磨テープの製造方法である。

【００１２】請求項８記載の発明は、研磨テープ用基材と、この基材上に設けられた研磨層とを備え、前記研磨層は平均粒子径１～２００mμの研磨材粒子と、この研磨材粒子を結合する結合剤とを有することを特徴とする研磨テープである。

【００１３】請求項１３記載の発明は、研磨テープ製造用の塗工剤において、平均粒子径１～２００mμの研磨材粒子と研磨材粒子用溶媒とを含んだ研磨材粒子液と、結合剤と結合剤用溶媒とを含んだ結合剤用樹脂液とを備えた塗工剤である。

【００１４】請求項１７記載の発明は、研磨テープ用基材を準備する工程と、平均粒子径１～２００mμの研磨材粒子と研磨材粒子用溶媒とを含んだ研磨材粒子液と、結合剤と結合剤用溶媒とを含んだ結合剤用樹脂液とを混合して塗工剤を作製する工程と、研磨テープ用基材上に塗工剤を塗布する工程と、塗布された塗工剤を乾燥する工程と、を備えたことを特徴とする研磨テープの製造方法である。

【００１５】請求項１記載の発明によれば、研磨テープ用基材に対して平均粒子径１０～１００mμの研磨材粒子を結合剤用樹脂液中に分散させた塗工剤により研磨層を形成したので、研磨層中の研磨材粒子の粒子径を小さくかつ粒子径の揃った微細粒子とすることができる。

【００１６】請求項５記載の発明によれば、平均粒子径１０～１００mμの研磨材粒子を結合剤用樹脂液中に分散させた後、結合剤樹脂中で研磨材粒子の凝集物を生成させ、粒子径５０～８００mμの研磨材粒子を含有する塗工剤とし、これを研磨テープ用基材に塗工することにより、研磨層中の研磨材粒子の粒子径を小さくかつ粒子径の揃った微細粒子を有する研磨テープを得ることができる。

【００１７】請求項８記載の発明によれば、研磨テープ用基材上に設けられた研磨層中の研磨粒子の平均粒子径を１～２００mμに保つことができる。

【００１８】請求項１３記載の発明によれば、平均粒径が１～２００mμの研磨材を含む塗工剤を容易に得ることができる。

【００１９】請求項１７記載の発明によれば、平均粒径が１～２００mμの研磨材を含む研磨層を有する研磨テープを製造することができる。

【００２０】

【発明の実施の形態】

第１の実施の形態

以下、図面を参照して本発明の実施の形態について説明する。図１および図２は本発明の第１の実施の形態を示す図である。

【００２１】図１において、平板状の精密部品、例えば半導体ウエハ１が示されている。このような半導体ウエハ１に対して、研磨テープ１０により最終仕上げ研磨が

行われるようになっている（図１参照）。なお、平板状の半導体ウエハ１はシリコン製となっている。

【００２２】また図１に示すように、研磨テープ１０は回転金属板１６上にエラストマ弾性体１５を介して配置される。

【００２３】次に図２により、研磨テープ１０について説明する。図２に示すように、研磨テープ１０はポリエステルフィルム等からなる研磨テープ用基材１１と、研磨テープ用基材１１上に設けられエポキシ樹脂、アクリル樹脂またはポリエステル樹脂を主成分とするプライマ層１２と、プライマ層１２上に設けられた研磨層１３とからなっている。ここで研磨テープ１０をシート状に形成してもよく、また帯状に形成してもよい。また、上記のプライマ層１２は、必ずしも必要とするものではなく、研磨テープ用基剤１０と、研磨層１３等を構成する素材によってその接着性等を考慮して設けられるものである。

【００２４】このうち研磨層１３は研磨テープ用基材１１に対して、平均粒子径１０～１００ｍμの研磨材粒子をバインダ用樹脂液（結合剤用樹脂液）中に分散させた塗工剤をプライマ層１２上に塗布することにより形成される。なお、プライマ層１２は必ずしも設ける必要はない。

【００２５】また研磨テープ用基材１１に対して、平均粒子径１０～１００ｍμ（ミリミクロン）の研磨材粒子をバインダ用樹脂液中に分散させた塗工剤を塗布することにより研磨層を形成した場合、研磨層１３中の研磨材粒子の粒子径は５０～８００ｍμとなる。

【００２６】研磨テープ１０を製造するに際し、平均粒子径１０～１００ｍμの研磨材粒子をバインダ用樹脂液中に分散させた後、この分散液中で研磨材粒子の凝集物を生成させ、粒子径５０～８００ｍμの研磨材粒子を含有する塗工剤を作製する。次いで、これを研磨テープ用基材に塗工することにより研磨テープ１０が製造される。

【００２７】上記の構成による本発明の研磨テープ１０およびその製造方法において、平均粒子径１０～１００ｍμの研磨材粒子としては、シリカゾルやアルミナゾルが使用できる。

【００２８】粒子径１μ以下のシリカやアルミナをバインダ用樹脂液中に分散させると、５～１０μの粗大粒子が生成し易く、これを利用して研磨層１３を形成した研磨テープ１０は、研磨層１３中の粗大粒子が原因となって、被研磨体に研磨傷が発生するようになる。

【００２９】これに対して、平均粒子径が１０～１００ｍμのシリカやアルミナをバインダ用樹脂液中に分散させると、上記の５～１０μの粗大粒子が生成することがなく、この塗工剤による研磨層１３を有する研磨テープは、光コネクタフェルール端面や、半導体ウエハ１表面の最終仕上げを行うのに好適な研磨テープになる。

【００３０】最終仕上げを行うのに好適であって、しかも研削性の高い研磨層１３にするためには、研磨層１３中の研磨材粒子の粒子径が５０～８００ｍμであることが必要である。

【００３１】研磨層１３中の研磨材粒子の粒子径が５０～８００ｍμの範囲にある研磨層は、以下の（１）～（２）の条件を組み合わせることによって得られる。

【００３２】（１）ほぼ球状をなす平均粒子径１０～１００ｍμのシリカやアルミナを、研磨層１３形成用の塗工剤を調整する際の研磨材粒子として使用すること。

【００３３】（２）研磨材粒子をバインダ用樹脂液中に分散させて塗工剤を得る工程、あるいは研磨材粒子をバインダ用樹脂液中に分散させた塗工剤を研磨テープ用基材に塗工する工程で、研磨材粒子の凝集を成長させ、粒子径５０～８００ｍμの研磨材粒子にすること。

【００３４】バインダ用樹脂液に分散させたシリカ粒子の粒子径を５０～８００ｍμに調整するには、シリカ粒子をバインダ用樹脂液に分散させた分散液のｐＨを７～９に調整し、数時間に亙ってゆるやかに攪拌し、シリカ粒子の凝集を生成させた後、０．８μのフィルタで濾過することにより粗大粒子を除去すればよい。

【００３５】また、バインダ用樹脂液としてＳｉ原子の骨格を有するシリコーン樹脂またはシリコーン系樹脂を有するものを使用すると、研磨層中でのシリカ粒子の粒度分布が狭くなり、より好ましい研磨層１３を構成することができる。

【００３６】これは、バインダ用樹脂液となるシリコーン樹脂またはシリコーン系樹脂とシリカ粒子との間の親和性が高いために、研磨層形成用の塗工剤の塗工、乾燥工程で、バインダ用樹脂が固化するときに、シリカ粒子も凝集してゆくためであると推定される。

【００３７】以上の構成による研磨層１３が形成される研磨テープ用基材１１としては、上述のように機械的強度、寸法安定性、耐熱性等に優れた性質を有する合成紙やプラスチックフィルムが使用され、例えば、ポリエチレンテレフタレート、延伸ポリプロピレン、ポリカーボネート、アセチルセルロースジエステル、アセチルセルローストリエステル、延伸ポリエチレン、ポリブチレンテレフタレート等による厚さ２０～１００μ程度のものが好適である。

【００３８】本実施の形態によれば、研磨テープ用基材１１に対して、平均粒子径１０～１００ｍμの研磨材粒子をバインダ用樹脂液中に分散させた塗工剤を用い、必要ならばプライマ層を介して塗工し研磨層１３を形成したので、研磨層１３中に５～１０μの粗大粒子からなる研磨材粒子の生成がない。またこのようにして得られた研磨テープ１０によれば、光コネクタフェルール端面や、半導体ウエハ１表面の最終仕上げを、被研磨体表面に研磨傷や研磨斑を生ずることなく行うことができる。

【００３９】また、研磨材粒子の粒子径が５０～８００

ｍμの研磨層１３を有する研磨テープ１０は、光コネクタフェルール端面や、半導体ウエハ１表面等の最終仕上げを行う際の研磨テープ１０として好適であり、しかも研削性の高い研磨テープ１０になる。

【００４０】第２の実施の形態

次に本発明の第２の実施の形態について説明する。第２の実施の形態は、研磨テープ１０のうち研磨層１３の構成が異なるのみであり、他は第１の実施の形態と略同一である。

【００４１】すなわち、研磨テープ１０はポリエステルフィルム等からなる研磨テープ用基材１１と、研磨テープ用基材１１上に設けられエポキシ樹脂、アクリル樹脂またはポリエステル樹脂を主成分とするプライマ層１２と、プライマ層１２上に設けられた研磨層１３とからなっている。また、上記のプライマ層１２は、必ずしも必要とするものではなく、研磨テープ用基剤１０と、研磨層１３等を構成する素材によってその接着性等を考慮して設けられるものである。

【００４２】このうち研磨層１３は、平均粒子径１～２００ｍμ（ミリミクロン）の研磨材粒子、例えばコロイダルシリカ粒子と、このシリカ粒子同志を結合する結合剤、例えば有機無機複合ポリマー樹脂とを有している。この場合、有機無機複合ポリマー樹脂は、その構造中にシロキサン結合を有する高分子化合物である。

【００４３】このように研磨層１３中において、コロイダルシリカ粒子が平均粒子径１～２００ｍμを維持したまま凝集することなく分散しているので、研磨層１３の全光線透過率は６０～９５％となっており、そのヘイズ値は１～７０％となっている。

【００４４】また研磨層１３表面の中心線平均粗さ（Ｒａ）は、０．００５～０．５μとなっているが、ほとんどの場合Ｒａは０．００７～０．２μの範囲内に入っている。

【００４５】次に各構成要素の材質について更に詳述する。

（１）　研磨層中の結合剤について

本発明において、結合剤としては、その構造中にシロキサン結合（Ｓｉ－Ｏ結合）を有するモノマー、プレポリマー若しくはオリゴマーまたはポリマー等を使用することができ、例えば、ポリシロキサンやその誘導体、その変性物、あるいはそのブレンド物、更にはそのモノマー、プレポリマー若しくはオリゴマー等を使用することができる。

【００４６】具体的には、例えばポリシロキサンを構成するモノマー、プレポリマー若しくはオリゴマーまたはポリマーは勿論のこと、該ポリシロキサンを構成するモノマー、プレポリマー若しくはオリゴマーまたはポリマーと、例えば、ポリエチレン系樹脂、ポリ塩化ビニル系樹脂、ポリ酢酸ビニル系樹脂、ポリアクリル系またはポリメタクリル系樹脂、ポリビニルアルコール系樹脂、エチレン共樹脂合体、ポリビニルアセタール系樹脂、ゴム系樹脂、ポリエステル系樹脂、ポリアミド系樹脂、フェノール系樹脂、アミノ－プラスト系樹脂、エポキシ樹脂、ポリウレタン系樹脂、セルロース系樹脂、その他の樹脂を構成するモノマー、プレポリマー若しくはオリゴマーまたはポリマーとを混合し、そのブレンド物、あるいは反応変性物等を使用することができる。

【００４７】特に、本発明においては、ポリエチレン系樹脂、ポリ塩化ビニル系樹脂、ポリ酢酸ビニル系樹脂、ポリアクリル系樹脂、ポリウレタン系樹脂、ポリエステル系樹脂等のプレポリマー若しくはオリゴマーあるいはポリマーと、ポリシロキサンのプレポリマー若しくはオリゴマーあるいはポリマーとを混合してなるブレンド物あるいは反応変性物を使用することが好ましい。

【００４８】更に詳しく説明すると、本発明においては、ポリエチレン系樹脂、ポリ塩化ビニル系樹脂、ポリ酢酸ビニル系樹脂、ポリアクリル系樹脂、ポリウレタン系樹脂、ポリエステル系樹脂等のプレポリマー若しくはオリゴマーあるいはポリマーを主鎖とし、その側鎖にポリシロキサンのプレポリマー若しくはオリゴマーあるいはポリマーを、例えば、グラフト重合等によって反応させ、主鎖部分を有機性で構成し、側鎖部分をシロキサン結合からなる無機性で構成してなる有機無機複合ポリマー、そのプレポリマーもしくはオリゴマー等を使用することが望ましいものである。

【００４９】而して、上記のような有機無機複合ポリマーを使用することによって、研磨粒子が、塗工材中、あるいは研磨層中で凝集することなく一次粒子の状態を保持することができ、微細な研磨に適する研磨テープを製造し得ると言う利点を有するものである。

【００５０】本発明において、上記のように研磨粒子が一次粒子の状態を保持し得る理由は、定かではないが、後述するように、結合剤として使用する樹脂中にシロキサン結合（Ｓｉ－Ｏ結合）を含有していると、研磨材粒子として、例えば、コロイダルシリカ粒子を使用する場合、その両者が相互にＳｉ原子を共通とする官能基を有することになり、両者が親和性を有して該研磨材粒子が、塗工材としての組成物の状態、あるいは塗膜状の研磨層の状態においても一次粒子の状態を保持し得ることにより、極めて良好に研磨仕上げできる研磨テープを製造し得るものと推定される。

（２）　プライマー層について

本発明において、プライマー層としては、例えば、ポリ塩化ビニル系樹脂、ポリ酢酸ビニル系樹脂、ポリアクリル系またはポリメタクリル系樹脂、ポリビニルアルコール系樹脂、エチレン共樹脂合体、ポリビニルアセタール系樹脂、ゴム系樹脂、ポリエステル系樹脂、ポリアミド系樹脂、フェノール系樹脂、アミノ－プラスト系樹脂、エポキシ系樹脂、ポリウレタン系樹脂、シリコーン系樹脂、セルロース系樹脂、その他の樹脂を構成するモノマ

ー、プレポリマー若しくはオリゴマーあるいはポリマーの一種ないしそれ以上をビヒクルの主成分とする組成物を塗布ないし印刷して形成することができる。

【００５１】更に、接着性を上げるために、イソシアネート等の硬化剤を入れてもよい。

（３）　研磨層中の研磨粒子について

本発明において、研磨粒子としては、例えば、アルミナ（酸化アルミニュウム）、酸化チタン、ジルコニア（酸化ジルコニュウム）、リチウムシリケート、ダイヤモンド、窒化ケイ素、炭化ケイ素、酸化鉄、酸化クロム、シリカ（酸化ケイ素）、酸化アンチモン等の無機化合物を使用することができる。

【００５２】而して、本発明においては、微細な研磨に適する研磨シートを製造することから、上記の研磨粒子は、その粒子径が、１乃至３００ｍμ位、好ましくは、１乃至２００ｍμ位で、一次粒子の状態のものを使用することが望ましい。

【００５３】特に、本発明において、研磨粒子としては、結合剤との親和性、相溶性を考慮すると、シリカ（酸化ケイ素）を使用することが最も好ましいものである。

【００５４】また、上記の本発明において、研磨粒子として、例えば、粒子径が５～５０ｍμ未満のものを使用し、更に、研磨粒子と結合剤との配合割合（重量％）を９０：１０から６０：４０の範囲内で使用すると、得られる研磨シートは、全光線透過率が９０～９５％、ヘーズ値が２～１５％の範囲内であって、比較的に透明性に富む研磨シートを得ることができ、該研磨シートは、光コネクタフェルール等の精密部品の表面の仕上げ研磨適性を有するものである。

【００５５】また、研磨粒子として、例えば、粒子径が５０～２００ｍμのものを使用し、更に、研磨粒子と結合剤との配合割合（重量％）を９０：１０から３０：７０の範囲内で使用すると、得られる研磨シートは、比較的に白濁した白色ないし半透明性に富む研磨テープとなり、上記と同様に、光コネクタフェルール等の精密部品の表面の仕上げ研磨適性を有するものである。

【００５６】上記のような現象は、研磨粒子として、シリカ粒子を使用する場合に、特に顕著なものである。なお、本発明において、研磨粒子と結合剤との配合割合において、研磨粒子が結合剤より少なくなると、得られる研磨テープの表面仕上げ研磨適性は、やや低下する傾向にある

【００５７】例えば、粒子径が５～５０ｍμ未満のものを使用し、更に、研磨粒子と結合剤との配合割合（重量％）として、結合剤の量を多くすると、得られる研磨テープの表面仕上げ研磨適性は、かなり低下する傾向を示すものである。

【００５８】この理由は、定かではないが、研磨粒子が結合剤中において表面に露出することがないことから、研磨能力を発揮し得ないことによるものと推定される。

【００５９】次に研磨テープ１０の製造方法について説明する。まず、ポリエステルフィルム、例えば２軸延伸ポリエチレンテレフタレートからなる厚さ１０～２００μ、好ましくは５０～１００μの研磨テープ用基材１１が準備される。次に研磨テープ１０上に、必要ならば例えばエポキシ樹脂、アクリル樹脂、またはポリエステル樹脂を主成分とするプライマ層１２が塗布される。このようにプライマ層１２を塗布することにより、光ファイバ２を研磨テープ１０によって研磨しても、研磨テープ用基材１１から研磨層１３が剥離することはない。

【００６０】次に平均粒子径１～２００ｍμの例えばコロイダルシリカ粒子とイソプロピルアルコール等の研磨材粒子用溶媒とを含んだコロイダルシリカゾル（研磨材粒子液）と、例えば有機無機複合ポリマー樹脂（結合剤）とイソプロピルアルコール等の結合剤用溶媒とを含んだ結合剤用樹脂液とを混合して塗工剤を作製する。

【００６１】この場合、塗工剤中では、コロイダルシリカ粒子が平均粒子径１～２００ｍμを維持し、凝集することなく分散している。

【００６２】なお、塗工剤中に有機無機複合ポリマー樹脂を硬化させるための硬化剤、例えばスズ化合物等の有機金属溶液を混入してもよく、また塗工剤中にコロイダルシリカ粒子を分散させるための分散剤、例えば非イオン界面活性剤を混入してもよい。

【００６３】塗工剤中に硬化剤を混入する場合、有機無機複合ポリマー樹脂（固形分）に対する硬化剤の溶液としての比率は、９０：１０であることが好ましい。

【００６４】また塗工剤中におけるＰ／Ｖ重量比、すなわちコロイダルシリカ粒子（固形分）／有機無機複合ポリマーシリコーン樹脂（固形分）＝２０：８０～９５：５（重量比）となっているが、このＰ／Ｖ重量比＝５０：５０～８０：２０であることが好ましい。

【００６５】次に研磨テープ用基材１１上のプライマ層１２に、塗工剤がグラビアリバース法によって塗布される。研磨テープ用基材１１上のプライマ層１２に塗工剤を塗布した後、研磨テープ用基材１１は直ちに１１０℃～１２０℃の温度で３０秒間程度加熱され、この間塗工剤中のイソプロピルアルコール等の溶媒が大気中へ飛散する。

【００６６】次に塗工剤中に硬化剤が混入している場合、研磨テープ用基材１１は更に８０℃で１０分間加熱される。他方、塗工剤中に硬化剤が混入していない場合、研磨テープ用基材１１は１００℃で１時間加熱される。このようにして塗工剤が乾燥し、プライマ層１２上に厚さ０．５～１０μ、好ましくは３～５μの研磨層１３が形成されて研磨テープ１０が得られる。

【００６７】なお、上記のような条件で塗工剤を乾燥させることにより、コロイダルシリカ粒子は凝集することなく研磨層１３中で平均粒子径１～２００ｍμを維持し

ながら分散することができる。

【００６８】すなわち、塗工剤を塗布した後、直ちにイソプロピルアルコール等の溶剤を飛散させないと、塗工剤中でコロイダルシリカ粒子が凝集する時間を与えてしまい、コロイダルシリカ粒子の平均粒子径が大きくなる。

【００６９】上述のように塗工剤中のコロイダルシリカ粒子は、塗工剤の作製工程、塗工剤のプライマ層１２上へ塗布工程、およびその後の乾燥工程のいずれの工程においても、平均粒子径１～２００ｍμを維持する。また研磨層１３中においてもコロイダルシリカ粒子は平均粒子径１～２００ｍμを維持する。

【００７０】このようにコロイダルシリカ粒子が、その平均粒子径１～２００ｍμを維持する理由は、およそ次のとおりである。

【００７１】すなわち、一般に粒子径１μ以下の粒子を、結合剤用樹脂液として広く用いられているポリエステル、ポリエステルウレタン、塩化ビニル・酢酸ビニル共重合体等の結合剤用樹脂液中に分散させて塗工剤を作製すると、凝集により５～１０μの粗大粒子が生成し易くなる。このため、この塗工剤を用いて形成された研磨層を有する研磨テープは、研磨層中の粗大粒子が原因となって、被研磨体に傷を発生させる。

【００７２】これに対して、本発明のように平均粒子径１～２００ｍμのコロイダルシリカを含むコロイダルシリカゾルと、有機無機複合ポリマー樹脂を含む結合剤用樹脂液とを混合して作製された塗工剤中においては、上記のような５～１０μの粗大粒子が生成することはない。このため、この塗工剤を用いて形成された研磨層を有する研磨シートは、光コネクタフェルール端面や半導体ウエハ１端面の最終仕上げを行うのに好適な研磨シートになる。

【００７３】すなわち本発明によれば、研磨材粒子であるコロイダルシリカがシラノール基を有しており、他方、樹脂液中の有機無機複合ポリマー樹脂がＳｉ原子を骨格としたポリシロキサンオリゴマー等の官能基を有しており、このポリシロキサンオリゴマーはシラノール基に対して親和性の高い官能基となっているので、コロイダルシリカは凝集することなく、結合剤用樹脂液中で分散することができる。また、コロイダルシリカをイソプロピルアルコール等の有機溶媒に安定に分散させたコロイダルシリカゾルと、同様にイソプロピルアルコール等の有機溶媒を含む粘性の低い樹脂液とを混合させて作製された塗工剤中においては、コロイダルシリカゾルと結合剤用樹脂液が同質の有機溶媒を含むので、結合剤用樹脂液中へのコロイダルシリカの分散が容易となり、塗工剤中でのコロイダルシリカの凝集の生成を抑制することができる。これらの有機溶媒としては、イソプロピルアルコールの他、メタノール、エタノール、キシレン・ブタノール、エチレングリコール、エチレングリコールーモノｎ－プロピルエーテル、ジメチルアセトアミド、メチルイソブチルケトン等が使用できる。

【００７４】研磨テープ１０において研磨テープ用基材１１、プライマ層１２および研磨層１３がいずれも透明性を有している場合、基材面と研磨層面の区別がつきにくいことから、誤使用の可能性がある。これを防止するには、研磨テープ基材に着色加工あるいは文字や図柄の印刷加工を施せば良い。

【００７５】このようにして製造された研磨テープを用いて、光コネクタフェルール端面や半導体ウエハ１の表面が研磨される。次に光コネクタフェルール２の表面の研磨方法について説明する。

【００７６】図３に示すように、回転金属板１６上にエラストマ弾性体１５を介して本発明による研磨テープ１０が配置され、研磨テープ１０上において光コネクタフェルール２の表面が水を潤滑剤として約２分間研磨される。上述のように研磨テープ１０の研磨層１３には凝集による５～１０μの粗粒子がなく、このため光コネクタフェルール２の表面を効率よく研磨できる。

【００７７】すなわち、本発明のように研磨テープ１０の研磨層１３に凝集による５～１０μの粗粒子を生じさせないようにすることにより、光コネクタフェルール２を均一かつ精度良く研磨することができる。また光コネクタフェルール２に傷を生じさせることなく、また研磨中に他の研磨材を含む研磨液を供給する必要はない。なお、被研摩体によっては研摩加工時に潤滑剤を供給するとさらに効率よく研摩できることがある。潤滑剤としては、水、アルコール、界面活性剤、オイル等一般的に知られているものを用いることができ、この場合、潤滑剤中に研摩材は含まれていない。潤滑剤を使用する場合、研摩材を含む研摩液を使用するメニカカルポリッシングと比較して、取扱いが容易であり作業性が良い。

【００７８】なお、研磨中、研磨テープ１０の研磨層１３は目詰まりすることなく、全体として徐々に減少していく。このため、研磨テープ１０の寿命は研磨層１３が存在する限り続くので、研磨テープ１０の寿命を長く維持することができる。

【００７９】尚、光コネクタフェルール２の代わりに半導体ウェハ１等の精密部品を研磨しても同様な効果を奏することができるものである。

【００８０】

【実施例】

第１の実施例

次に本発明の第１の実施例について説明する。この第１の実施例は第１の実施の形態に対応している。

【００８１】以下、本発明の研磨テープおよびその製造方法の具体的な構成を、実施例に基づいて説明する。

【００８２】［実施例１］

研磨層用の塗工剤

水分散高分子ポリエステル樹脂液［東洋紡績（株）：バ

イロナールMD１２００］１０重量部に、平均粒子径１０～２０mμの水性シリカゾル［日産化学工業（株）：スノーテックス３０］１０重量部を添加した後、撹拌し、粘度１００ｃｐｓの研磨層用の塗工剤［ａ］を得た。

【００８３】研磨テープの製造
厚さ５０μのポリエチレンテレフタレートフィルム［帝人（株）：低熱収縮ＳＧタイプ］からなる研磨テープ用基材の片面に、上記の研磨層用の塗工剤［ａ］を、３本リバース法によって２０ｇ（ｄｒｙ）／m^2 に塗工、乾燥し、本発明の実施例品である研磨テープ（Ａ）を得た。

【００８４】この研磨テープ（Ａ）により、５吋シリコンウエハの表面の最終仕上げであるヘイズの除去を行ったところ、研磨傷や研磨斑のない最終仕上げが行えた。

【００８５】［実施例２］
研磨層用の塗工剤
水分散高分子ポリエステル樹脂液［東洋紡績（株）：バイロナールMD１２００］１０重量部と、平均粒子径１０～２０mμの水性シリカゾル［日産化学工業（株）：スノーテックス３０］１０重量部との混合液を有機酸によってｐＨ７．５に調整した後、４時間のゆるやかな撹拌を行い、さらに０．８μのフィルタで濾過することにより、粘度１００ｃｐｓの研磨層用の塗工剤［ｂ］を得た。

【００８６】研磨テープの製造
厚さ５０μのポリエチレンテレフタレートフィルム［帝人（株）：低熱収縮ＳＧタイプ］からなる研磨テープ用基材の片面に、上記の研磨層用の塗工剤［ｂ］を、３本リバース法によって２０ｇ（ｄｒｙ）／m^2 に塗工、乾燥し、本発明の実施例品である研磨テープ（Ｂ）を得た。

【００８７】研磨テープ（Ｂ）における研磨層は白化しており、研磨層中のシリカ粒子の凝集が生じていることが明らかである。

【００８８】なお、研磨テープ（Ｂ）の研磨層を電子顕微鏡で観察したところ、研磨層中のシリカ粒子の粒子径が０．１～０．８μ（１００～８００mμ）であることが確認できた。

【００８９】この研磨テープ（Ｂ）により、５吋シリコンウエハの表面の最終仕上げであるヘイズの除去を行ったところ、０．１μ以上の研削性能が確認できた。

【００９０】［実施例３］
研磨層用の塗工剤
シリコーン系塗工剤［日本合成ゴム（株）：グラスカＨＰＣ７５０２］１０重量部に、平均粒子径１０～２０mμのイソプロパノールシリカゾル［日産化学工業（株）：ＩＰＡ－ＳＴ］１０重量部を添加した後、撹拌し、粘度１００ｃｐｓの研磨層用の塗工剤［ｃ］を得た。

【００９１】研磨テープの製造
厚さ５０μのポリエチレンテレフタレートフィルム［帝人（株）：低熱収縮ＳＧタイプ］からなる研磨テープ用基材の片面に、上記の研磨層用の塗工剤［ｃ］を、３本リバース法によって２０ｇ（ｄｒｙ）／m^2 に塗工、乾燥し、本発明の実施例品である研磨テープ（Ｃ）を得た。

【００９２】この研磨テープ（Ｃ）により、光コネクタフェルールの端面の研磨を行ったところ、研磨傷や研磨斑が殆どない最終仕上げが行えた。

【００９３】［実施例４］厚さ５０μのポリエチレンテレフタレートフィルム［帝人（株）：低熱収縮ＳＧタイプ］からなる研磨テープ用基材の片面に、実施例３で使用した研磨層用の塗工剤［ｃ］を、３本リバース法によって３０ｇ（ｄｒｙ）／m^2 に塗工、乾燥し、本発明の実施例品である厚さ２０μの研磨層を有する研磨テープ（Ｄ）を得た。

【００９４】この研磨テープ（Ｄ）により、光コネクタフェルールの端面の研磨を行なったところ、研磨傷や研磨斑の全くない鏡面仕上げを行なうことができ、信号の減衰特性の良好な光コネクタフェルールが得られた。

【００９５】［実施例５］
研磨層用の塗工剤
水分散系ポリエステル樹脂液［東洋紡績（株）：バイロナールMD－１２４５］に、平均粒子径１０～２０mμのコロイダルシリカ［日産化学工業（株）：スノーテックス３０］を、ポリエステル樹脂／シリカ＝１／１（重量比）になるように混合した後、アンモニア水溶液を添加してｐＨ７に調整した。

【００９６】これを２時間撹拌した後、０．８μのフィルタで濾過し、研磨層用の塗工剤［ｅ］を得た。

【００９７】研磨テープの製造
厚さ５０μのポリエチレンテレフタレートフィルム［帝人（株）：低熱収縮ＳＧタイプ］からなる研磨テープ用基材の片面に、上記の研磨層用の塗工剤［ｅ］を、３本リバース法によって３０ｇ（ｄｒｙ）／m^2 に塗工、乾燥し、本発明の実施例品である研磨テープ（Ｅ）を得た。

【００９８】この研磨テープ（Ｅ）により、光コネクタフェルールの端面の研磨を行なったところ、研磨傷や研磨斑の全くない最終仕上げを行なうことができ、信号の減衰特性の良好な光コネクタフェルールが得られた。

【００９９】第２の実施例
次に第２の実施例について説明する。この第２の実施例は第２の実施の形態に対応している。

【０１００】［実施例６］
研磨層用の塗工剤
有機無機複合ポリマーシリコーン樹脂液［日本合成ゴム（株）：セラミックコート材グラスカＨＰＣ７５０２、メタノール溶媒、固形分３０％］２０重量部に、平均粒

子径１０～１５ｍμのコロイダルシリカゾル［日産化学工業（株）：オルガノシリカゾルＩＰＡ－ＳＴ、イソプロピルアルコール溶媒、固形分３０％］８０重量部を添加した後、超音波分散を行い、研磨層用の塗工剤（ｆ）を得た。

【０１０１】有機無機複合ポリマーシリコーン樹脂液［日本合成ゴム（株）：セラミックコート材グラスカＨＰＣ７５０２、メタノール溶媒、固形分３０％］２０重量部に、平均粒子径１０～１５ｍμのコロイダルシリカゾル［日産化学工業（株）：オルガノシリカゾルＩＰＡ－ＳＴ、イソプロピルアルコール溶媒、固形分３０％］８０重量部および硬化剤［日本合成ゴム（株）：ＨＰＣ４０４Ｈ］２重量部を添加した後、超音波分散を行い、研磨層用の塗工剤（ｇ）を得た。

【０１０２】有機無機複合ポリマーシリコーン樹脂液［日本合成ゴム（株）：セラミックコート材グラスカＨＰＣ７５０２、メタノール溶媒、固形分３０％］２０重量部に、分散剤［日本合成ゴム（株）：カルボン酸系分散剤］３重量部、平均粒子径１０～１５ｍμのコロイダルシリカゾル［日産化学工業（株）：オルガノシリカゾルＩＰＡ－ＳＴ、イソプロピルアルコール溶媒、固形分３０％］８０重量部および硬化剤［日本合成ゴム（株）：ＨＰＣ４０４Ｈ］２重量部を添加した後、超音波分散を行い、研磨層用の塗工剤（ｈ）を得た。

【０１０３】ここで、上記グラスカＨＰＣ７５０２、ＨＰＣ４０４ＨおよびＩＰＡ－ＳＴの各材料の特性を下表に示す。

【０１０４】

【表１】

表　１

グラスカ ＨＰＣ７５０２	ＨＰＣ４０４Ｈ	ＩＰＡ－ＳＴ
溶 媒　メタノール	溶 媒　イソブタノール	溶 媒　イソプロパノール
固形分　３１％	固形分　１％未満	固形分　３０％
粘 度　４～１６ｃｐｓ	粘 度　２～１５ｃｐｓ	粘 度　３～２０ｃｐｓ

【０１０５】研磨テープの製造法

上記の研磨層用の塗工剤（ｆ）、（ｇ）または（ｈ）を濾過精度１μでフィルタリングを行った。次に厚さ７５μのポリエチレンテレフタレートフィルム［アイ・シー・アイ・ジャパン（株）：易接着処理Ｍｅｌｉｎｅｘ５４２タイプ］からなる研磨テープ用基材の片面（易接着処理面）に、上記塗工剤（ｆ）、（ｇ）または（ｈ）をグラビアリバース法（斜線版９５線、版深８０μ）によって５ｇ（ｄｒｙ／ｍ^{2}）に塗工し、加熱乾燥した後、３μ（ｄｒｙ）厚の研磨層を有する研磨テープ（Ｆ）（研磨層用の塗工剤（ｆ）を使用）、（Ｇ）（研磨層用の塗工剤（ｇ）を使用）、（Ｈ）（研磨層用の塗工剤（ｈ）を使用）を得た。

【０１０６】一方、厚さ７５μのポリエチレンテレフタレートフィルム［東洋紡（株）：コロナ処理Ｅ５１００タイプ］からなる研磨テープ用基材の片面（コロナ処理面）に、アンカーコート剤［日本合成ゴム（株）：エポキシ系アンカーコート剤］をグラビアリバース法（斜線版２００線、版深３０μ）によって１ｇ（ｄｒｙ／ｍ^{2}）塗工してプライマ層を形成した。次にプライマ層上に上記の研磨層用の塗工剤（ｆ）、（ｇ）または（ｈ）を各々グラビアリバース法（斜線版９５線、版深８０μ）によって５ｇ（ｄｒｙ／ｍ^{2}）塗工し、乾燥加熱した後、３μ（ｄｒｙ）厚の研磨層を有する研磨テープＦ’（研磨層用の塗工剤（ｆ）を使用）、Ｇ’（研磨層用の塗工剤（ｇ）を使用）、Ｈ’（研磨層用の塗工剤（ｈ）を使用）を得た。

【０１０７】上記の方法によって得られた研磨テープ（Ｆ）、（Ｇ）、（Ｈ）、（Ｆ’）、（Ｇ’）、（Ｈ’）における研磨層は、研磨材粒子の凝集による５～１０μの粗大粒子を含んでおらず、また研磨層表面の中心線平均粗度（Ｒａ）が約０．１μと微細になっていた。ここで研磨層表面の中心線平均粗度（Ｒａ）は、（株）東京精密：表面粗さ形状測定機サーフコム５９０Ａでカットオフ値０．８ｍｍで測定した（以下実施例７～１３においても同様）。また、研磨テープ（Ｆ）の全光線透過率は９１％、ヘイズ値は９％と透明性を有していた。

【０１０８】［実施例７］

研磨層用の塗工剤

有機無機複合ポリマーシリコーン樹脂液［日本合成ゴム（株）：セラミックコート材グラスカＨＰＣ７５０２、メタノール溶媒、固形分３０％］３０重量部に、平均粒子径１０～１５ｍμのコロイダルシリカゾル［日産化学工業（株）：オルガノシリカゾルＩＰＡ－ＳＴ、イソプロピルアルコール溶媒、固形分３０％］７０重量部を添加した後、超音波分散を行い、研磨層用の塗工剤（ｉ）を得た。

【０１０９】研磨テープの製造法
上記の研磨層用の塗工剤（ｉ）を濾過渡精度１μでフィルタリングを行なった。次に厚さ７５μのポリエチレンテレフタレートフィルム［アイ・シー・アイ・ジャパン（株）：易接着処理Ｍｅｌｉｎｅｘ５４２タイプ］からなる研磨テープ用基材の片面（易接着処理面）に、上記塗工剤（ｉ）をグラビアリバース法（斜線版９５線、版深８０μ）によって５ｇ（ｄｒｙ／m^2）に塗工し、加熱乾燥した後、３μ（ｄｒｙ）厚の研磨層を有する研磨テープ（Ｉ）を得た。

【０１１０】上記の方法によって得られた研磨テープ（Ｉ）における研磨層は、研磨材粒子の凝集による５～１０μの粗大粒子を含んでおらず、また研磨層表面の中心線平均粗度（Ｒａ）が約０．２μと微細になっていた。また研磨テープの全光線透過率は９２％。ヘイズ値は１０％と透明性を有していた。

【０１１１】［実施例８］
研磨層用の塗工剤
有機無機複合ポリマーシリコーン樹脂液［日本合成ゴム（株）：セラミックコート材グラスカＨＰＣ７５０２、メタノール溶媒、固形分３０％］３５重量部に、平均粒子径１０～１５ｍμのコロイダルシリカゾル［日産化学工業（株）：オルガノシリカゾルＩＰＡ－ＳＴ、イソプロピルアルコール溶媒、固形分３０％］６５重量部を添加した後、超音波分散を行い、研磨層用の塗工剤（ｊ）を得た。

【０１１２】研磨テープの製造法
上記の研磨層用の塗工剤（ｊ）を濾過渡精度１μでフィルタリングを行なった。次に厚さ７５μのポリエチレンテレフタレートフィルム［アイ・シー・アイ・ジャパン（株）：易接着処理Ｍｅｌｉｎｅｘ５４２タイプ］からなる研磨テープ用基材の片面（易接着処理面）に、上記塗工剤をグラビアリバース法（斜線版９５線、版深８０μ）によって５ｇ（ｄｒｙ／m^2）に塗工し、加熱乾燥した後、３μ（ｄｒｙ）厚の研磨層を有する研磨テープ（Ｊ）を得た。

【０１１３】上記の方法によって得られた研磨テープ（Ｊ）における研磨層は、研磨材粒子の凝集による５～１０μの粗大粒子を含んでおらず、また研磨層表面の中心線平均粗度（Ｒａ）が約０．１μと微細になっていた。また研磨テープの全光線透過率は９２％。ヘイズ値は１３％と透明性を有していた。

【０１１４】［実施例９］
研磨層用の塗工剤
シリコーンワニス［信越化学工業（株）：ＫＲ－２２０ＩＰＡ、イソプロピルアルコール溶媒、固形分５１％］３０重量部に、平均粒子径１０～１５ｍμのコロイダルシリカゾル［日産化学工業（株）：オルガノシリカゾルＩＰＡ－ＳＴ、イソプロピルアルコール溶媒、固形分３０％］２００重量部を添加した後、超音波分散を行い、研磨層用の塗工剤（ｋ）を得た。

【０１１５】研磨テープの製造法
上記の研磨層用の塗工剤（ｋ）を濾過渡精度１μでフィルタリングを行なった。次に厚さ７５μのポリエチレンテレフタレートフィルム［アイ・シー・アイ・ジャパン（株）：易接着処理Ｍｅｌｉｎｅｘ５４２タイプ］からなる研磨テープ用基材の片面（易接着処理面）に、上記塗工剤をグラビアリバース法（斜線版９５線、版深８０μ）によって５ｇ（ｄｒｙ／m^2）に塗工し、加熱乾燥した後、３μ（ｄｒｙ）厚の研磨層を有する研磨テープ（Ｋ）を得た。

【０１１６】上記の方法によって得られた研磨テープ（Ｋ）における研磨層は、研磨材粒子の凝集による５～１０μの粗大粒子を含んでおらず、また研磨層表面の中心線平均粗度（Ｒａ）が０．３μ以下と微細になっていた。また研磨テープは透明性を有していた。

【０１１７】［実施例１０］
研磨層用の塗工剤
有機無機複合ポリマーシリコーン樹脂液［日本合成ゴム（株）：セラミックコート材グラスカＨＰＣ７５０２、メタノール溶媒、固形分３０％］２０重量部に、平均粒子径７０～１００ｍμのコロイダルシリカゾル［日産化学工業（株）：オルガノシリカゾルＩＰＡ－ＳＴ、イソプロピルアルコール溶媒、固形分３０％］８０重量部を添加した後、超音波分散を行い、研磨層用の塗工剤（ｌ）を得た。

【０１１８】研磨テープの製造法
上記の研磨層用の塗工剤（ｌ）を濾過渡精度１μでフィルタリングを行なった。次に厚さ７５μのポリエチレンテレフタレートフィルム［アイ・シー・アイ・ジャパン（株）：易接着処理Ｍｅｌｉｎｅｘ５４２タイプ］からなる研磨テープ用基材の片面（易接着処理面）に、上記塗工剤をグラビアリバース法（斜線版９５線、版深８０μ）によって５ｇ（ｄｒｙ／m^2）に塗工し、加熱乾燥した後、３μ（ｄｒｙ）厚の研磨層を有する研磨テープ（Ｌ）を得た。

【０１１９】上記の方法によって得られた研磨テープ（Ｌ）における研磨層は、研磨材粒子の凝集による５～１０μの粗大粒子を含んでおらず、また研磨層表面の中心線平均粗度（Ｒａ）が約０．２μと微細になっていた。また研磨テープの全光透過率は８５％、ヘイズ値は６１％と半透明性を有していた。

【０１２０】［実施例１１］
研磨層用の塗工剤
有機無機複合ポリマーシリコーン樹脂液［日本合成ゴム（株）：セラミックコート材グラスカＨＰＣ７５０２、メタノール溶媒、固形分３０％］３０重量部に、平均粒子径７０～１００ｍμのコロイダルシリカゾル［日産化学工業（株）：オルガノシリカゾル、イソプロピルアルコール溶媒、固形分３０％］７０重量部を添加した後、

超音波分散を行い、研磨層用の塗工剤（ｍ）を得た。

【０１２１】研磨テープの製造法
上記の研磨層用の塗工剤（ｍ）を濾過渡精度１μでフィルタリングを行なった。次に厚さ７５μのポリエチレンテレフタレートフィルム［アイ・シー・アイ・ジャパン（株）：易接着処理Ｍｅｌｉｎｅｘ５４２タイプ］からなる研磨テープ用基材の片面（易接着処理面）に、上記塗工剤をグラビアリバース法（斜線版９５線、版深８０μ）によって５ｇ（ｄｒｙ／m^2）に塗工し、加熱乾燥した後、３μ（ｄｒｙ）厚の研磨層を有する研磨テープ（Ｍ）を得た。

【０１２２】上記の方法によって得られた研磨テープ（Ｍ）における研磨層は、研磨材粒子の凝集による５～１０μの粗大粒子を含んでおらず、また研磨層表面の中心線平均粗度（Ｒａ）が約０．２μと微細になっていた。また研磨テープの全光透過率は８７％、ヘイズ値は６８％と半透明性を有していた。

【０１２３】［実施例１２］
研磨層用の塗工剤
有機無機複合ポリマーシリコーン樹脂液［日本合成ゴム（株）：セラミックコート材グラスカＨＰＣ７５０２、メタノール溶媒、固形分３０％］４０重量部に、平均粒子径７０～１００ｍμのコロイダルシリカゾル［日産化学工業（株）：オルガノシリカゾル、イソプロピルアルコール溶媒、固形分３０％］６０重量部を添加した後、超音波分散を行い、研磨層用の塗工剤（ｎ）を得た。

【０１２４】研磨テープの製造法
上記の研磨層用の塗工剤（ｎ）を濾過渡精度１μでフィルタリングを行なった。次に厚さ７５μのポリエチレンテレフタレートフィルム［アイ・シー・アイ・ジャパン（株）：易接着処理Ｍｅｌｉｎｅｘ５４２タイプ］からなる研磨テープ用基材の片面（易接着処理面）に、上記塗工剤をグラビアリバース法（斜線版９５線、版深８０μ）によって５ｇ（ｄｒｙ／m^2）に塗工し、加熱乾燥した後、３μ（ｄｒｙ）厚の研磨層を有する研磨テープ（Ｎ）を得た。

【０１２５】上記の方法によって得られた研磨テープ（Ｎ）における研磨層は、研磨材粒子の凝集による５～１０μの粗大粒子を含んでおらず、また研磨層表面の中心線平均粗度（Ｒａ）が約０．２μと微細になっていた。また研磨テープの全光透過率は８９％、ヘイズ値は４６％と半透明性を有していた。

【０１２６】［実施例１３］
研磨層用の塗工剤
有機無機複合ポリマーシリコーン樹脂液［日本合成ゴム（株）：セラミックコート材グラスカＨＰＣ７５０２、メタノール溶媒、固形分３０％］５０重量部に、平均粒子径７０～１００ｍμのコロイダルシリカゾル［日産化学工業（株）：オルガノシリカゾル、イソプロピルアルコール溶媒、固形分３０％］５０重量部を添加した後、超音波分散を行い、研磨層用の塗工剤（ｏ）を得た。

【０１２７】研磨テープの製造法
上記の研磨層用の塗工剤（ｏ）を濾過渡精度１μでフィルタリングを行なった。次に厚さ７５μのポリエチレンテレフタレートフィルム［アイ・シー・アイ・ジャパン（株）：易接着処理Ｍｅｌｉｎｅｘ５４２タイプ］からなる研磨テープ用基材の片面（易接着処理面）に、上記塗工剤をグラビアリバース法（斜線版９５線、版深８０μ）によって５ｇ（ｄｒｙ／m^2）に塗工し、加熱乾燥した後、３μ（ｄｒｙ）厚の研磨層を有する研磨テープ（Ｏ）を得た。

【０１２８】上記の方法によって得られた研磨テープ（Ｏ）における研磨層は、研磨材粒子の凝集による５～１０μの粗大粒子を含んでおらず、また研磨層表面の中心線平均粗度（Ｒａ）が約０．２μと微細になっていた。また研磨テープの全光透過率は９０％、ヘイズ値は２０％と透明性を有していた。

【０１２９】上記の方法によって各研磨テープ（Ｆ）、（Ｉ）、（Ｊ）、（Ｌ）、（Ｍ）、（Ｎ）、（Ｏ）の全線透過率ヘイズ値、外観、光コネクタの研磨、特性について評価した結果を以下表２に示す。

【０１３０】

【表２】

表２　研磨テープの評価結果

	研磨テープ	シリカ 平均粒子径 (ｍμ)	ＰＶ比 シリカ／結合剤 (重量比)	全光線 透過率 (%)	ヘイズ値 (%)	外　観	光コネクタの 研磨特性
実施例　６	Ｆ	１０～１５	８０／２０	９１	９	透　明	○
実施例　７	Ｉ	１０～１５	７０／３０	９２	１０	透　明	○
実施例　８	Ｊ	１０～１５	６５／３５	９２	１３	透　明	○
実施例１０	Ｌ	７０～100	８０／２０	８５	６１	半透明	○
実施例１１	Ｍ	７０～100	７０／３０	８７	６８	半透明	○
実施例１２	Ｎ	７０～100	６０／４０	８９	４６	半透明	○
実施例１３	Ｏ	７０～100	５０／５０	９０	２０	透　明	○

【０１３１】なお、表２中の全光線透過率（％）およびヘイズ値（％）はスガ試験機（株）：カラーコンピュータＳＭ－５で測定した。また、光コネクタの研磨特性は、光コネクタ（ジルコニアフェルール）を（株）精工技術：光ファイバ研磨機ＳＦＰ１２０Ａで実施例品の研磨テープを用いて最終仕上げ研磨を行なった後、光学顕微鏡および（株）東京精密：三次元表面粗さ形状解析システムサーフコム５９０Ａ－３ＤＦで傷の有無や光ファイバーのヘコミを検査した結果である。

【０１３２】比較例１

線状飽和ポリエステル樹脂［東洋紡績（株）：バイロン＃５３０］５０重量部とトルエン７０重量部とメチルエチルケトン７０重量部とを含む樹脂液中に、平均粒子径８００ｍμの酸化アルミニウム微粉末［昭和電工（株）：ＷＡ＃１００００］２００重量部を添加し、サンドミルで良く分散させた後、これをトルエンとメチルエチルケトンとの等量混合溶剤で希釈することにより、粘度１００ｃｐｓの研磨層用の塗工剤［ｐ］を得た。

【０１３３】厚さ７５μのポリエチレンテレフタレートフィルム［東洋紡（株）：コロナ処理Ｅ５１００タイプ］からなる研磨テープ用基材の片面（コロナ処理面）に、上記の研磨層用塗工剤［ｐ］を３本リバース法によって４０ｇ（ｄｒｙ／ｍ^2 ）塗工、加熱乾燥して比較例品である研磨テープ（Ｐ）を得た。

【０１３４】比較例２

線状飽和ポリエステル樹脂［東洋紡績（株）：バイロン＃５３０］３０重量部とトルエン４０重量部とメチルエチルケトン４０重量部とを含む樹脂液中に、平均粒子径１０～２０ｍμのコロイダルシリカを含むコロイダルシリカゾル［日産化学工業（株）：オルガノシリカゾルＭＥＫ－ＳＴ、メチルエチルケトン溶媒、固形分３０％］４００重量部を添加した後、これをトルエンとメチルエチルケトンとの等量混合溶剤で希釈することにより、粘度２０ｃｐｓの研磨層用の塗工剤［ｑ］を得た。

【０１３５】厚さ７５μのポリエチレンテレフタレートフィルム［東洋紡（株）：コロナ処理Ｅ５１００タイプ］からなる研磨テープ用基材の片面（コロナ処理面）に、上記の研磨層用の塗工剤［ｑ］をグラビアリバース法（斜線版９５線、版深８０μ）によって５ｇ（ｄｒｙ／ｍ^2 ）塗工し、加熱乾燥して、比較例品である研磨テープ（Ｑ）を得た。

【０１３６】比較例１、２によって得られた研磨テープ（Ｐ）、（Ｑ）を用いて光コネクタフェルール端面の最終仕上げを行なった結果、フェルール端面表面には研磨傷や研磨斑が生じ研磨特性は良好でなかった。

【０１３７】以上、上記の方法によって得られた各研磨テープ（Ｆ）、（Ｇ）、（Ｈ）、（Ｆ′）、（Ｇ′）、（Ｈ′）、（Ｉ）、（Ｊ）、（Ｋ）、（Ｌ）、（Ｍ）、（Ｎ）および（Ｏ）の研磨テープの研磨層は、いずれも研磨材粒子の凝集による５～１０μの粗大粒子を含んでおらず、また研磨層表面の中心線平均粗度（Ｒａ）が０．３μ以下となっていた。

【０１３８】また、使用する研磨剤粒子の粒子径、あるいは研磨剤粒子と結合剤の配合割合によって透明性や白濁した白色ないしは半透明性を有しているが、光コネクタフェルール端面の研磨特性は研磨テープ（Ｐ）、（Ｑ）と比較して全て良好であった。つまり光コネクタフェルール端面の最終仕上げを行ったところ、研磨傷や研磨斑の全くない鏡面仕上げを行うことができ、光信号の減衰特性の良好な光コネクタフェルールが得られた。

【０１３９】なお、光コネクタフェルールに代えて、半導体ウエハ、金属、セラミックス、カラーフィルター（液晶表示用等）、プラズマディスプレイ、光学レンズ、磁気ディスクあるいは光ディスク基板、磁気ヘッド、光学読取ヘッド等の精密部品に対して同様の最終仕上げ研磨テストを行った。この結果、光コネクタフェル

ールの場合と同様の結果が得られた。

【０１４０】

【発明の効果】請求項１記載の発明によれば、研磨層中の研磨材粒子が、粒子径の小さい粒子径の揃っている微細粒子からなり、かつ研磨層中には５〜１０μの粗大粒子が存在していないため、光コネクタフェルールや半導体ウエハ等の精密部品表面等の最終仕上げを、研磨傷や研磨斑を生ずることなく行うことができる。

【０１４１】また、請求項５記載の発明によれば、最終仕上げを行うのに好適で、しかも研削性の高い研磨テープを、容易かつ確実に得ることができる。

【０１４２】請求項８記載の発明によれば、研磨層中の研磨材粒子の平均粒子径が１〜２００mμに保たれているので、光コネクタフェルールや半導体ウエハ等の精密部品を研磨する際、表面の傷をなくすことができる。

【０１４３】請求項１３記載の発明によれば、平均粒径が１〜２００mμの研磨材を含む塗工剤を得ることができる。

【０１４４】請求項１７記載の発明によれば、最終仕上げを行うのに好適な研磨テープを容易かつ確実に得ることができる。

【図面の簡単な説明】

【図１】本発明による研磨テープを用いた研磨工程を示す図。

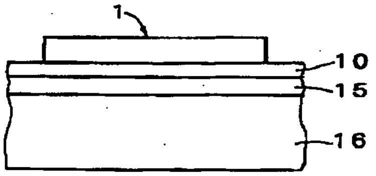
【図２】研磨テープの層構成を示す図。

【図３】光コネクタフェルールの研磨作用を示す図。

【符号の説明】

１	半導体ウエハ
２	光コネクタフェルール
２ａ	端面
３	光ファイバ
４	被覆部
１０	研磨テープ
１１	研磨テープ用基材
１２	プライマ層
１３	研磨層

【図１】



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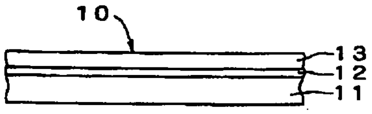
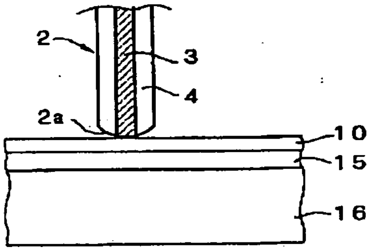


【図３】



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JAPANESE [JP,08-336758,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS CORRECTION OR AMENDMENT

[Translation done.]

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CLAIMS

[Claim(s)]
[Claim 1] The polish tape characterized by forming a polish layer to the base material for polish tapes by the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders.
[Claim 2] The resin liquid for binders is a polish tape according to claim 1 characterized by having silicone resin or silicone system resin.
[Claim 3] For an abrasives particle, claims 1 or 2 characterized by being a silica particle are the polish tapes of a publication either.
[Claim 4] For the particle diameter of the abrasives particle in a polish layer, claims 1, 2, or 3 characterized by being 50-800mmicro are the polish tapes of a publication either.
[Claim 5] The manufacture approach of the polish tape characterized by making the aggregate of an abrasives particle generate in the resin liquid for binders, considering as the coating agent containing the abrasives particle of particle diameter 100-800mmicro, and subsequently to the base material for polish tapes carrying out coating of this after distributing the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders.
[Claim 6] The resin liquid for binders is the manufacture approach of the polish tape according to claim 5 characterized by having silicone resin or silicone system resin.
[Claim 7] Claims 5 or 6 whose abrasives particles are silica particles are the manufacture approaches of the polish tape a publication either.
[Claim 8] It is the polish tape which is equipped with the base material for polish tapes, and the polish layer prepared on this base material, and is characterized by said polish layer having the binder which combines the abrasives particle and this abrasives particle of mean-particle-diameter 1-200mmicro.
[Claim 9] An abrasives particle is a polish tape according to claim 8 characterized by being a silica particle.
[Claim 10] For a binder, claims 8 or 9 characterized by being the binder which has siloxane association are the polish tapes of a publication either.
[Claim 11] Claims 8, 9, or 10 characterized by for the total light transmission of a polish layer being 60 - 95%, and the Hayes value being 1 - 70% are the polish tapes of a publication either.
[Claim 12] Claims 8, 9, 10, or 11 characterized by preparing an etching primer layer between the base material for polish tapes and a polish layer are the polish tapes of a publication either.
[Claim 13] The coating agent characterized by having the resin liquid for binders which contained the abrasives particle liquid containing the abrasives particle of mean-particle-diameter 1-200mmicro, and the solvent for abrasives particles, and a binder and the solvent for binders in the coating agent for polish tape manufacture.
[Claim 14] The weight ratio of the abrasives particle and binder in a coating agent is a coating agent according to claim 13 characterized by being 20:80-95:5.
[Claim 15] Claims 13 or 14 characterized by having a curing agent for stiffening a binder further are the coating agents of a publication either.
[Claim 16] Claims 13, 14, or 15 characterized by having a dispersant for distributing an abrasives particle further are the coating agents of a publication either.

[Claim 17] The manufacture approach of the polish tape characterized by to have the process which mixes the resin liquid containing the abrasives particle liquid containing the process for which the base material for polish tapes is prepared, and the abrasives particle of mean-particle-diameter 1-200mmicro and the solvent for abrasives particles, and a binder and the solvent for binders for binders, and produces a coating agent, the process which apply a coating agent on the base material for polish tapes, and the process which dry the applied coating agent.
[Claim 18] An abrasives particle is the manufacture approach of the polish tape according to claim 17 characterized by being a silica particle.
[Claim 19] For a binder, claims 17 or 18 characterized by being the binder which has siloxane association are the manufacture approaches of the polish tape a publication either.
[Claim 20] For the process which applies a coating agent, claims 17, 18, or 19 characterized by being carried out by the gravure reversing method are the manufacture approaches of the polish tape a publication either.
[Claim 21] For the desiccation process of a coating agent, claims 17, 18, 19, or 20 characterized by heating the paint immediately after applying the paint, and having the process which disperses the solvent for abrasives particles and the solvent for binders in the paint are the manufacture approaches of the polish tape a publication either.
[Claim 22] Claims 17, 18, 19, 20, or 21 characterized by having the process which forms an etching primer layer in the coating agent application side on the base material for polish tapes beforehand are the manufacture approaches of the polish tape a publication either.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a suitable polish tape to perform the last finishing over the front face of precision components, such as an optical connecter ferrule, a semi-conductor wafer, a metal, the ceramics, light filters (for liquid crystal displays etc.), a plasma display, an optical lens, a magnetic disk or an optical disk substrate, the magnetic head, and an optical read head, an end face, etc., its manufacture approach, and the coating agent for polish tapes.
[0002]
[Description of the Prior Art] Polish by which the quality is influenced and is called mechanical polishing to the last finishing polish is performed by the precision in the polish process to which precision components, such as an optical connecter ferrule and a semi-conductor wafer, carry out the last finishing.
[0003] This mechanical polishing is performed as follows. That is, the polish liquid which alkali solutions, such as caustic alkali of sodium, ammonia, and ethanolamine, are made to suspend the abrasives particle which has the particle diameter of 5-300mmicro, and turns into them from the colloidal liquid of pH 9-12 first is produced. Next, precision components, such as an optical connecter ferrule and a semi-conductor wafer, are ground on abrasive cloth, supplying this polish liquid on the abrasive cloth which consists of resin sheets, such as polyurethane.
[0004]
[Problem(s) to be Solved by the Invention] There are the following problems in mechanical polishing using above polish liquid and abrasive cloth.
[0005] That is, since the concentration of the abrasives particle in polish liquid changes during polish or the particle size distribution of an abrasives particle change with condensation of an abrasives particle, a polish blemish and polish spots may occur on the ground bodies, such as an optical connecter ferrule and a semi-conductor wafer. Moreover, the process which rinses the abrasives particle adhering to the front face of the ground bodies, such as an optical connecter ferrule and a semi-conductor wafer, and is removed is required after polish termination, and a polish process is complicated.
[0006] On the other hand, it considers forming a polish layer for the coating agent which makes it come to distribute an abrasives particle coating and by drying into the resin liquid for binders (binder) to the base material for polish tapes which consists of a plastic film, and producing a polish tape. Although an optical connecter ferrule, a semi-conductor wafer, etc. are ground on this polish tape, in case a polish tape is produced, it is difficult to make homogeneity distribute an abrasives particle with a particle diameter of 1micro or less in the resin liquid for binders, and it cannot be used as a polish tape for the last finishing.
[0007] That is, although high-degree-of-accuracy polish of the last finishing is performed by polish by the detailed abrasives particle, since surface energy increases and it becomes easy to condense an abrasives particle as particle diameter becomes small, it is difficult to make homogeneity distribute a detailed abrasives particle in a binder.
[0008] Moreover, when a polish layer is formed by the coating agent containing the abrasives

particle of a state of aggregation, the big and rough particle (5-10micro) is generating in a polish layer, and generating of the polish blemish of the ground body surface by this is not avoided.
[0009] Without the abrasives particle which this invention be make in consideration of such a point , and consist of a big and rough particle into a polish layer exist , only a detailed abrasives particle be make to exist and it aim at offer the polish tape which can perform precision components mirror finish , such as an optical connecter ferrule end face and a semi-conductor wafer front face , with a sufficient precision , its manufacture approach , and the coating agent for polish tapes .
[0010]
[Means for Solving the Problem] Invention according to claim 1 is a polish tape characterized by forming a polish layer to the base material for polish tapes by the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders.
[0011] Invention according to claim 5 is the manufacture approach of the polish tape characterized by making the aggregate of an abrasives particle generate in binder resin liquid, considering as the coating agent containing the abrasives particle of particle diameter 100-800mmicro, and subsequently to the base material for polish tapes carrying out coating of this, after distributing the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders.
[0012] Invention according to claim 8 is equipped with the base material for polish tapes, and the polish layer prepared on this base material, and said polish layer is a polish tape characterized by having the binder which combines the abrasives particle and this abrasives particle of mean-particle-diameter 1-200mmicro.
[0013] Invention according to claim 13 is the coating agent equipped with the resin liquid for binders containing the abrasives particle liquid containing the abrasives particle of mean-particle-diameter 1-200mmicro, and the solvent for abrasives particles, and a binder and the solvent for binders in the coating agent for polish tape manufacture.
[0014] The abrasives particle liquid containing the process which invention according to claim 17 prepares the base material for polish tapes, and the abrasives particle of mean-particle-diameter 1-200mmicro and the solvent for abrasives particles, It is the manufacture approach of the polish tape characterized by having the process which mixes the resin liquid for binders containing a binder and the solvent for binders, and produces a coating agent, the process which applies a coating agent on the base material for polish tapes, and the process which dries the applied coating agent.
[0015] Since the polish layer was formed by the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders to the base material for polish tapes according to invention according to claim 1, the particle diameter of the abrasives particle in a polish layer can be made into the very fine particle to which particle diameter was small equal.
[0016] After distributing the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders according to invention according to claim 5, By making the aggregate of an abrasives particle generate in binder resin, considering as the coating agent containing the abrasives particle of particle diameter 50-800mmicro, and carrying out coating of this to the base material for polish tapes The polish tape which has the very fine particle to which particle diameter was small equal in the particle diameter of the abrasives particle in a polish layer can be obtained.
[0017] According to invention according to claim 8, the mean particle diameter of the polish particle in the polish layer prepared on the base material for polish tapes can be maintained at 1-200mmicro.
[0018] According to invention according to claim 13, the coating agent containing the abrasives whose mean particle diameter is 1-200mmicro can be obtained easily.
[0019] According to invention according to claim 17, the polish tape which has a polish layer containing the abrasives whose mean particle diameter is 1-200mmicro can be manufactured.
[0020]
[Embodiment of the Invention]

With reference to a drawing, the gestalt of operation of this invention is explained below the gestalt of the 1st operation. Drawing 1 and drawing 2 are drawings showing the gestalt of operation of the 1st of this invention.
[0021] It is shown in drawing 1 , plate-like precision components 1, for example, semi-conductor wafer. The last finishing polish is performed by the polish tape 10 to such a semi-conductor wafer 1 (refer to drawing 1). In addition, the plate-like semi-conductor wafer 1 serves as a product made from silicon.
[0022] Moreover, as shown in drawing 1 , the polish tape 10 is arranged through the elastomer elastic body 15 on the revolution metal plate 16.
[0023] Next, drawing 2 explains the polish tape 10. As shown in drawing 2 , the polish tape 10 consists of the base material 11 for polish tapes which consists of polyester film etc., an etching primer layer 12 which is prepared on the base material 11 for polish tapes, and uses an epoxy resin, acrylic resin, or polyester resin as a principal component, and a polish layer 13 prepared on the etching primer layer 12. The polish tape 10 may be formed in the shape of a sheet here, and you may form in band-like. Moreover, the above-mentioned etching primer layer 12 is not necessarily needed, and it is prepared in consideration of the adhesive property etc. with the basis 10 for polish tapes, and the raw material which constitutes polish layer 13 grade.
[0024] Among these, the polish layer 13 is formed by applying the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders (resin liquid for binders) on the etching primer layer 12 to the base material 11 for polish tapes. In addition, it is not necessary to necessarily form the etching primer layer 12.
[0025] Moreover, when a polish layer is formed by applying the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro (millimicron) in the resin liquid for binders to the base material 11 for polish tapes, the particle diameter of the abrasives particle in the polish layer 13 serves as 50-800mmicro.
[0026] After facing manufacturing the polish tape 10 and distributing the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders, the aggregate of an abrasives particle is made to generate in these dispersion liquid, and the coating agent containing the abrasives particle of particle diameter 50-800mmicro is produced. Subsequently, the polish tape 10 is manufactured by carrying out coating of this to the base material for polish tapes.
[0027] In the polish tape 10 and its manufacture approach of this invention by the above-mentioned configuration, a silica sol and alumina sol can be used as an abrasives particle of mean-particle-diameter 10-100mmicro.
[0028] If a silica and an alumina with a particle diameter of 1micro or less are distributed in the resin liquid for binders, it is easy to generate a big and rough particle (5-10micro), and the big and rough particle in the polish layer 13 will become a cause, and a polish blemish will come to generate the polish tape 10 which formed the polish layer 13 using this on the ground body.
[0029] On the other hand, if the silica and alumina whose mean particle diameter is 10-100mmicro are distributed in the resin liquid for binders, the polish tape which the above-mentioned big and rough particle (5-10micro) does not generate, and has the polish layer 13 by this coating agent will turn into a suitable polish tape to perform the last finishing of an optical connecter ferrule end face and semi-conductor wafer 1 front face.
[0030] It is suitable to perform the last finishing, and in order to make it the high polish layer 13 of grindability moreover, it is required for the particle diameter of the abrasives particle in the polish layer 13 to be 50-800mmicro.
[0031] The polish layer in the range whose particle diameter of the abrasives particle in the polish layer 13 is 50-800mmicro is obtained by combining the conditions of the following (1) - (2).

[0032] (1) Use the silica and alumina of mean-particle-diameter 10-100mmicro which make the shape of a ball mostly as an abrasives particle at the time of adjusting the coating agent for polish layer 13 formation.
[0033] (2) At the process which is made to distribute an abrasives particle in the resin liquid for binders, and obtains a coating agent, or the process which carries out coating of the coating agent which distributed the abrasives particle in the resin liquid for binders to the base material

for polish tapes, grow up condensation of an abrasives particle and make it the abrasives particle of particle diameter 50-800mmicro.

[0034] What is necessary is just to remove a big and rough particle by filtering with a 0.8micro filter, after adjusting pH of the dispersion liquid which made the resin liquid for binders distribute a silica particle to 7-9, stirring gently for several hours and making condensation of a silica particle generate, in order to adjust the particle diameter of the silica particle which the resin liquid for binders was made to distribute to 50-800mmicro.

[0035] Moreover, if what has the silicone resin or silicone system resin which has the frame of Si atom as resin liquid for binders is used, the particle size distribution of the silica particle in the inside of a polish layer become narrow, and can constitute the more desirable polish layer 13.

[0036] Since this has the high compatibility between the silicone resin or silicone system resin used as the resin liquid for binders, and a silica particle, it is presumed to be the coating of the coating agent for polish stratification, and a desiccation process, and to be for also condensing a silica particle, when the resin for binders solidifies.

[0037] The synthetic paper and plastic film which have the property which was excellent in a mechanical strength, dimensional stability, thermal resistance, etc. as mentioned above as a base material 11 for polish tapes with which the polish layer 13 by the above configuration is formed are used, for example, a thing with a thickness [by polyethylene terephthalate, drawing polypropylene, a polycarbonate, acetyl-cellulose diester, acetyl-cellulose triester, drawing polyethylene polybutylene terephthalate, etc.] of about 20-100micro is suitable.

[0038] Since coating was carried out through the etching primer layer and the polish layer 13 was formed using the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders to the base material 11 for polish tapes according to the gestalt of this operation when required, there is no generation of the abrasives particle which consists of a big and rough particle (5-10micro) into the polish layer 13. Moreover, according to the polish tape 10 obtained by doing in this way, the last finishing of an optical connecter ferrule end face and semi-conductor wafer 1 front face can be performed, without producing a polish blemish and polish spots in a ground body surface.

[0039] Moreover, the polish tape 10 which has the polish layer 13 whose particle diameter of an abrasives particle is 50-800mmicro is suitable as a polish tape 10 at the time of performing the last finishing of an optical connecter ferrule end face, semi-conductor wafer 1 front face, etc., and turns into the high polish tape 10 of grindability.

[0040] the gestalt of the 2nd operation -- the gestalt of operation of the 2nd of this invention is explained below. The configuration of the polish layer 13 only of the gestalten of the 2nd operation only differing is among the polish tapes 10, and others are the gestalt and abbreviation identitas of the 1st operation.

[0041] That is, the polish tape 10 consists of the base material 11 for polish tapes which consists of polyester film etc., an etching primer layer 12 which is prepared on the base material 11 for polish tapes, and uses an epoxy resin, acrylic resin, or polyester resin as a principal component, and a polish layer 13 prepared on the etching primer layer 12. Moreover, the above-mentioned etching primer layer 12 is not necessarily needed, and it is prepared in consideration of the adhesive property etc. with the basis 10 for polish tapes, and the raw material which constitutes polish layer 13 grade.

[0042] Among these, the polish layer 13 has, the abrasives particle of mean-particle-diameter 1-200mmicro (millimicron), for example, a colloidal silica particle, and the binder which combines this silica particle comrade, for example, organic inorganic compound polymer resin. In this case, organic inorganic compound polymer resin is a high molecular compound which has siloxane association in that structure.

[0043] Thus, since it is distributing without condensing while the colloidal silica particle had maintained mean-particle-diameter 1-200mmicro in the polish layer 13, the total light transmission of the polish layer 13 is 60 - 95%, and the Hayes value has become 1 - 70%.

[0044] Moreover, although the arithmetical mean deviation of profile (Ra) of polish layer 13 front face is 0.005-0.5micro, in almost all cases, as for close, Ra is within the limits of 0.007-0.2micro.

[0045] Next, the construction material of each component is explained further in full detail.

(1) the monomer which has siloxane association (Si-O association) in the structure as a binder in this invention about the binder in a polish layer, a prepolymer, oligomer, or a polymer — it can be used — for example, a polysiloxane, its derivative, its denaturation object, or its blend object — the monomer, a prepolymer, or oligomer can be used further.
[0046] Specifically not to mention the monomer which constitutes a polysiloxane, a prepolymer, oligomer, or a polymer The monomer, the prepolymer, the oligomer, or the polymer which constitutes this polysiloxane, For example, polyethylene system resin, polyvinyl chloride system resin, polyvinyl acetate system resin, The Pori acrylic or poly methacrylic system resin, polyvinyl alcohol system resin, Ethylene Resin coalesce, polyvinyl-acetal system resin, rubber system resin, polyester system resin, Polyamide system resin, phenol system resin, amino-PURASUTO system resin, an epoxy resin, The monomer, the prepolymer, the oligomer, or the polymer which constitutes polyurethane system resin, cellulose type resin, and other resin can be mixed, and the blend object or a reaction denaturation object can be used.
[0047] It is desirable to use especially the blend object or reaction denaturation object which comes to mix prepolymers, such as polyethylene system resin, polyvinyl chloride system resin, polyvinyl acetate system resin, Pori acrylic resin, polyurethane system resin, and polyester system resin, oligomer or a polymer, and the prepolymer, the oligomer or the polymer of a polysiloxane in this invention.
[0048] If it explains in detail, it will set to this invention. Furthermore, polyethylene system resin, polyvinyl chloride system resin, Polyvinyl acetate system resin, Pori acrylic resin, polyurethane system resin, A prepolymer, oligomer, or polymers, such as polyester system resin, are used as a principal chain. To the side chain, the prepolymer, the oligomer, or the polymer of a polysiloxane For example, it is desirable to use the organic inorganic compound polymer which is made to react by graft polymerization etc., constitutes a principal chain part from organic nature, and comes to constitute a side-chain part from inorganic nature which consists of siloxane association, its prepolymer, or oligomer.
[0049] By **(ing) and using the above organic inorganic compound polymers, the condition of a primary particle can be held without a polish particle condensing in coating material or a polish layer, and it has the advantage referred to as being able to manufacture the polish tape suitable for detailed polish.
[0050] In this invention, why a polish particle can hold the condition of a primary particle as mentioned above If siloxane association (Si-O association) is contained in the resin used as a binder so that it may mention later although it is not certain As an abrasives particle, for example, when a colloidal silica particle is used, When the both will have the functional group which makes Si atom common mutually, both have compatibility and this abrasives particle can hold the condition of a primary particle also in the condition of the constituent as coating material, or the condition of a paint film-like polish layer What can manufacture the polish tape which can carry out polish finishing very good is presumed.
It sets to this invention about a primer layer. (2) As a primer layer For example, polyvinyl chloride system resin, polyvinyl acetate system resin, the Pori acrylic, or poly methacrylic system resin, Polyvinyl alcohol system resin and ethylene Resin coalesce, polyvinyl-acetal system resin, Rubber system resin, polyester system resin, polyamide system resin, phenol system resin, Amino-PURASUTO system resin, epoxy system resin, polyurethane system resin, silicone system resin, It can apply thru/or print and the constituent which makes a kind of the monomer which constitutes cellulose type resin and other resin, a prepolymer, oligomer, or a polymer thru/or more than it the principal component of a vehicle can be formed.
[0051] Furthermore, in order to raise an adhesive property, curing agents, such as isocyanate, may be put in.
(3) In this invention, inorganic compounds, such as an alumina (oxidization aluminum), titanium oxide, a zirconia (zirconium oxide), lithium silicate, a diamond, silicon nitride, silicon carbide, ferrous oxide, chromic oxide, a silica (silicon oxide), and antimony oxide, can be used as a polish particle, for example about the polish particle in a polish layer.
[0052] It is desirable for the particle diameter to be as desirable as 1 thru/or 300mmicro, and to be only 1 thru/or 200mmicro and to use the thing of the condition of a primary particle for the

above-mentioned polish particle from **(ing) and manufacturing the polish sheet suitable for detailed polish in this invention.
[0053] It is most desirable to use a silica (silicon oxide) in this invention, especially, if compatibility with a binder and compatibility are taken into consideration as a polish particle.
[0054] Moreover, if particle diameter uses the thing below 5-50mmicro and the blending ratio of coal (% of the weight) of a polish particle and a binder is further used within the limits of 90:10 to 60:40 as a polish particle in above-mentioned this invention The polish sheet obtained can obtain the polish sheet which total light transmission is [90 - 95% and a haze value] within the limits which is 2 - 15%, and is rich in transparency in comparison, and, as for this polish sheet, it has the finishing polish fitness of the front face of precision components, such as an optical connecter ferrule.
[0055] moreover, as a polish particle, that whose particle diameter is 50-200mmicro is used, and further, when the blending ratio of coal (% of the weight) of a polish particle and a binder is used within the limits of 90:10 to 30:70, the polish sheet obtained serves as a white polish tape which was comparatively alike and became cloudy and which is, carries out and is rich in a translucency, and it has the finishing polish fitness of the front face of precision components, such as an optical connecter ferrule, like the above.
[0056] As a polish particle, the above phenomena are especially remarkable, when using a silica particle. In addition, the surface-finish polish fitness of the polish tape which will be obtained if a polish particle becomes less than a binder in the blending ratio of coal of a polish particle and a binder in this invention is [0057] which tends to fall a little. For example, particle diameter uses the thing below 5-50mmicro, and further, as the blending ratio of coal (% of the weight) of a polish particle and a binder, when the amount of a binder is made [many], the surface-finish polish fitness of the polish tape obtained shows the inclination to fall considerably.
[0058] Although this reason is not certain, since a polish particle is not exposed on a front face into a binder, it is presumed to be what is depended on the ability of polish capacity not to be demonstrated.
[0059] Next, the manufacture approach of the polish tape 10 is explained. First, the base material 11 for polish tapes (50-100micro) is prepared preferably 10-200micro in thickness it is thin from polyester film, for example, biaxial drawing polyethylene terephthalate. Next, if required on the polish tape 10, the etching primer layer 12 which uses an epoxy resin, acrylic resin, or polyester resin as a principal component will be applied. Thus, even if it grinds an optical fiber 2 on the polish tape 10 by applying the etching primer layer 12, the polish layer 13 does not exfoliate from the base material 11 for polish tapes.
[0060] Next, the resin liquid for binders containing the colloidal silica sol (abrasives particle liquid) containing for example, the colloidal silica particle of mean-particle-diameter 1-200mmicro and solvents for abrasives particles, such as isopropyl alcohol, and for example, organic inorganic compound polymer resin (binder) and solvents for binders, such as isopropyl alcohol, is mixed, and a coating agent is produced.
[0061] In this case, it is distributing in a coating agent, without a colloidal silica particle maintaining and condensing mean-particle-diameter 1-200mmicro.
[0062] In addition, the dispersant for mixing organic metal solutions, such as the curing agent for stiffening organic inorganic compound polymer resin, for example, a tin compound etc., into a coating agent, and distributing a colloidal silica particle in a coating agent, for example, a nonionic surface active agent, may be mixed.
[0063] When mixing a curing agent into a coating agent, as for the ratio as a solution of the curing agent to organic inorganic compound polymer resin (solid content), it is desirable that it is 90:10.
[0064] moreover — although it has become the P/V weight ratio in a coating agent, colloidal silica particle (solid content) / organic inorganic compound polymer silicone resin (solid content) =20:80-95:5 [i.e.,], (weight ratio) — this P/V weight ratio — it is desirable that it is =50:50-80:20.
[0065] Next, a coating agent is applied to the etching primer layer 12 on the base material 11 for polish tapes by the gravure reversing method. After applying a coating agent to the etching

primer layer 12 on the base material 11 for polish tapes, grade heating of the base material 11 for polish tapes is promptly carried out for 30 seconds at the temperature of 110 degrees C - 120 degrees C, and solvents, such as isopropyl alcohol in a coating agent, disperse into atmospheric air in the meantime.
[0066] Next, when the curing agent is mixing into a coating agent, the base material 11 for polish tapes is heated for 10 minutes at 80 more degrees C. On the other hand, when the curing agent is not mixing into a coating agent, the base material 11 for polish tapes is heated at 100 degrees C for 1 hour. Thus, a coating agent dries, on the etching primer layer 12, 0.5-10micro in thickness, the polish layer (3-5micro) 13 is formed preferably, and the polish tape 10 is obtained.

[0067] In addition, a colloidal silica particle can be distributed by drying a coating agent on the above conditions, maintaining mean-particle-diameter 1-200mmicro in the polish layer 13 without condensing.
[0068] That is, if solvents, such as isopropyl alcohol, are not dispersed immediately after applying a coating agent, the time amount which a colloidal silica particle condenses in a coating agent will be given, and the mean particle diameter of a colloidal silica particle will become large.
[0069] The colloidal silica particle in a coating agent maintains mean-particle-diameter 1-200mmicro also in which process of a spreading process and a subsequent desiccation process to up to the making process of a coating agent, and the etching primer layer 12 of a coating agent as mentioned above. Moreover, a colloidal silica particle maintains mean-particle-diameter 1-200mmicro in the polish layer 13.
[0070] Thus, the reason a colloidal silica particle maintains the mean-particle-diameter 1-200mmicro is as follows about.
[0071] That is, if a particle with a particle diameter of 1micro or less is generally distributed in the resin liquid for binders, such as polyester widely used as resin liquid for binders, polyester polyurethane, and a vinyl chloride vinyl acetate copolymer, and a coating agent is produced, condensation will become easy to generate a big and rough particle (5-10micro). For this reason, the big and rough particle in a polish layer becomes a cause, and the polish tape which has the polish layer formed using this coating agent makes the ground body generate a blemish.
[0072] On the other hand, the above big and rough particles (5-10micro) do not generate the colloidal silica sol which contains colloidal silica of mean-particle-diameter 1-200mmicro like this invention, and the resin liquid for binders containing organic inorganic compound polymer resin in the coating agent mixed and produced. For this reason, the polish sheet which has the polish layer formed using this coating agent turns into a suitable polish sheet to perform the last finishing of an optical connecter ferrule end face or semi-conductor wafer 1 end face.
[0073] That is, since according to this invention the colloidal silica which is an abrasives particle has the silanol group, it has functional groups, such as polysiloxane oligomer to which the organic inorganic compound polymer resin in another side and resin liquid made Si atom the frame, and this polysiloxane oligomer serves as a functional group with high compatibility to the silanol group, colloidal silica can be distributed in the resin liquid for binders, without condensing. Moreover, since a colloidal silica sol and the resin liquid for binders contain a homogeneous organic solvent in the coating agent which was made to mix the colloidal silica sol which made stability distribute colloidal silica to organic solvents, such as isopropyl alcohol, and the viscous low resin liquid which contains organic solvents, such as isopropyl alcohol, similarly, and was produced, distribution of the colloidal silica to the inside of the resin liquid for binders becomes easy, and generation of condensation of the colloidal silica in the inside of a coating agent can be controlled. As these organic solvents, the methanol [besides isopropyl alcohol], ethanol, xylene butanol, ethylene glycol, and ethylene glycol-mono-n-propyl ether, dimethylacetamide, methyl isobutyl ketone, etc. can be used.
[0074] When the base material 11 for polish tapes, the etching primer layer 12, and polish layers 13 all have transparency in the polish tape 10, since it is hard to attach distinction of a base material side and a polish stratification plane, there is possibility of misuse. What is necessary is just to perform coloring processing or printing processing of an alphabetic character or a pattern to a polish tape base material, in order to prevent this.

[0075] Thus, an optical connecter ferrule end face and the front face of the semi-conductor wafer 1 are ground using the manufactured polish tape. Next, the polish approach of the front face of the optical connecter ferrule 2 is explained.

[0076] As shown in drawing 3 , the polish tape 10 by this invention is arranged through the elastomer elastic body 15 on the revolution metal plate 16, and the front face of the optical connecter ferrule 2 uses water as lubricant on the polish tape 10, and it is ground for about 2 minutes. There is no coarse grain (5-10micro) by condensation in the polish layer 13 of the polish tape 10 as mentioned above, and, for this reason, the front face of the optical connecter ferrule 2 can be ground efficiently.

[0077] Namely, the optical connecter ferrule 2 can be ground with homogeneity and a sufficient precision by making it not make the polish layer 13 of the polish tape 10 produce the coarse grain (5-10micro) by condensation like this invention. Moreover, it is not necessary to supply the polish liquid containing other abrasives during polish, without making the optical connecter ferrule 2 produce a blemish. In addition, when lubricant is supplied depending on the polished body at the time of polishing processing, it may be able to polish still more efficiently. As lubricant, things generally known, such as water, alcohol, a surfactant, and oil, can be used, and the abrasives is not contained in lubricant in this case. When using lubricant, as compared with MENIKA cull polishing which uses the polishing liquid containing an abrasives, handling is easy and workability is good.

[0078] In addition, the polish layer 13 of the polish tape 10 decreases gradually as a whole during polish, without carrying out blinding. For this reason, since the life of the polish tape 10 continues as long as the polish layer 13 exists, the life of the polish tape 10 is maintainable for a long time.

[0079] In addition, the same effectiveness can be done so even if it grinds the precision components of semi-conductor wafer 1 grade instead of the optical connecter ferrule 2.

[0080]

[Example]

The 1st example, next the 1st example of this invention are explained. This 1st example is equivalent to the gestalt of the 1st operation.

[0081] Hereafter, the concrete configuration of the polish tape of this invention and its manufacture approach is explained based on an example.

[0082] [Example 1]

coating agent moisture powder giant-molecule polyester resin liquid [for polish layers — Toyobo Co., Ltd.: — after adding the aquosity silica sol [Nissan Chemical Industries, Ltd.:Snow tex 30] 10 weight section of mean-particle-diameter 10-20mmicro in the BAIRONARU MD1200]10 weight section, it stirred in it and the coating agent with a viscosity of 100cps for polish layers [a] was obtained in it.

[0083] with a manufacture thickness [of a polish tape] of 50micro polyethylene terephthalate film [— Teijin, Ltd.: — one side of the base material for polish tapes which consists of low heat shrink SG type] — the coating agent for the above-mentioned polish layers [a] — the 3 reversing method — 20g (dry) / m2 The coating and polish tape (A) which it dries and is the example article of this invention was obtained.

[0084] On this polish tape (A), when Hayes which is the last finishing of the front face of a 5-inch silicon wafer was removed, the last finishing without a polish blemish or polish spots was able to be performed.

[0085] [Example 2]

coating agent moisture powder giant-molecule polyester resin liquid [for polish layers — Toyobo Co., Ltd.: — after the organic acid adjusted the mixed liquor of the BAIRONARU MD1200]10 weight section and the aquosity silica sol [Nissan Chemical Industries, Ltd.:Snow tex 30] 10 weight section of mean-particle-diameter 10-20mmicro to pH7.5, the coating agent with a viscosity of 100cps for polish layers [b] was obtained by performing loose stirring of 4 hours and filtering with a 0.8 moremicro filter.

[0086] with a manufacture thickness [of a polish tape] of 50micro polyethylene terephthalate film [— Teijin, Ltd.: — one side of the base material for polish tapes which consists of low heat shrink SG type] — the coating agent for the above-mentioned polish layers [b] — the 3 reversing method — 20g (dry) / m2 The coating and polish tape (B) which it dries and is the example article of this invention was obtained.

[0087] It is clear that have milked the polish layer in a polish tape (B), and condensation of the silica particle in a polish layer has arisen.

[0088] In addition, when the polish layer of a polish tape (B) was observed with the electron microscope, it has checked that the particle diameter of the silica particle in a polish layer was 0.1-0.8micro (100-800mmicro).

[0089] On this polish tape (B), when Hayes which is the last finishing of the front face of a 5-inch silicon wafer was removed, grindability ability 0.1micro or more has been checked.

[0090] [Example 3]

coating agent silicone system coating agent [for polish layers — Japan Synthetic Rubber Co., Ltd.: — the GURASUKA HPC7502]10 weight section — isopropanol silica sol [of mean-particle-diameter 10-20mmicro — Nissan Chemical Industries, Ltd. — after adding the :IPA-ST]10 weight section, it stirred and the coating agent with a viscosity of 100cps for polish layers [c] was obtained.

[0091] with a manufacture thickness [of a polish tape] of 50micro polyethylene terephthalate film [— Teijin, Ltd.: — one side of the base material for polish tapes which consists of low heat shrink SG type] — the coating agent for the above-mentioned polish layers [c] — the 3 reversing method — 20g (dry) / m2 The coating and polish tape (C) which it dries and is the example article of this invention was obtained.

[0092] On this polish tape (C), when the end face of an optical connecter ferrule was ground, the last finishing which almost has neither a polish blemish nor polish spots was able to be performed.

[0093] with a [example 4] thickness of 50micro polyethylene terephthalate film [— Teijin, Ltd.: — the coating agent for polish layers [c] used for one side of the base material for polish tapes which consists of low heat shrink SG type] in the example 3 — the 3 reversing method — 30g (dry) / m2 The polish tape (D) which has a polish layer with a coating and a thickness of 20micro which it dries and is the example article of this invention was obtained.

[0094] This polish tape (D) could perform mirror finish which has neither a polish blemish nor polish spots when the end face of an optical connecter ferrule is ground, and the good optical connecter ferrule of the damping property of a signal was obtained.

[0095] [Example 5]

coating agent moisture powder system polyester resin liquid [for polish layers — Toyobo Co., Ltd.: — after mixing colloidal silica [the Nissan Chemical Industries, Ltd.:Snow tex 30] of mean-particle-diameter 10-20mmicro to BAIRONARU MD-1245] so that it may be set to polyester resin / silica =1 / 1 (weight ratio), the aqueous ammonia solution was added to it and it adjusted to pH7 at it.

[0096] After stirring this for 2 hours, it filtered with the 0.8micro filter and the coating agent for polish layers [e] was obtained.

[0097] with a manufacture thickness [of a polish tape] of 50micro polyethylene terephthalate film [— Teijin, Ltd.: — one side of the base material for polish tapes which consists of low heat shrink SG type] — the coating agent for the above-mentioned polish layers [e] — the 3 reversing method — 30g (dry) / m2 The coating and polish tape (E) which it dries and is the example article of this invention was obtained.

[0098] This polish tape (E) could perform the last finishing which has neither a polish blemish nor polish spots when the end face of an optical connecter ferrule is ground, and the good optical connecter ferrule of the damping property of a signal was obtained.

[0099] The 2nd example, next 2nd example are explained. This 2nd example is equivalent to the gestalt of the 2nd operation.

[0100] [Example 6]

polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content —

30 — % —] — 20 — weight — the section — mean particle diameter — ten - 15 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — IPA - ST — isopropyl alcohol — a solvent — solid content — 30 — % —] — 80 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (f) — having obtained .

[0101] organic inorganic compound polymer silicone resin liquid [— Japan Synthetic Rubber Co., Ltd.: — ceramic coat material GURASUKA HPC7502, a methanol solvent, and the solid content 30%]20 weight section — the colloidal silica sol [Nissan Chemical Industries, Ltd.:ORGANO silica sol IPA-ST, isopropyl alcohol solvent, and 30% of solid content] 80 weight section of mean-particle-diameter 10-15mmicro, and curing agent [— Japan Synthetic Rubber Co., Ltd. — after adding the :HPC404H]2 weight section, ultrasonic distribution was performed and the coating agent for polish layers (g) was obtained.

[0102] Organic inorganic compound polymer silicone resin liquid [Japan Synthetic Rubber Co., Ltd. : Ceramic coat material GURASUKA HPC7502, a methanol solvent, In the 30%]20 weight section of solid content, the dispersant [Japan Synthetic Rubber Co., Ltd.:carboxylic-acid system dispersant] 3 weight section, Colloidal silica sol [Nissan Chemical Industries, Ltd. of mean-particle-diameter 10-15mmicro : ORGANO silica sol IPA-ST, isopropyl alcohol solvent, 30%]80 weight section [of solid content], and curing agent [— Japan Synthetic Rubber Co., Ltd. — after adding the :HPC404H]2 weight section, ultrasonic distribution was performed and the coating agent for polish layers (h) was obtained.

[0103] Here, the property of each ingredient of above-mentioned GURASUKA HPC7502, HPC404H, and IPA-ST is shown in the following table.

[0104]

[A table 1]

表 1

グラスカ HPC7502	HPC404H	IPA-ST
溶 媒 メタノール	溶 媒 イソブタノール	溶 媒 イソプロパノール
固形分 31%	固形分 1%未満	固形分 30%
粘 度 4～16cps	粘 度 2～15cps	粘 度 3～20cps

[0105] The coating agent for the polish layers of the manufacturing method above of a polish tape (f), (g), or (h) was filtered by 1micro of filtration accuracies. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — on one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] the above-mentioned coating agent (f), (g), or (h) — the gravure reversing method (the slash version — 95 line) the polish tape (F) which has the polish layer of 3micro (dry) thickness after carrying out coating to 5g (dry/m2) and carrying out stoving to it by 80micro of version ** — (— the coating agent for polish layers (f) — activity) and (G) — (— the coating agent for polish layers (g) — activity) and (H) — (— the coating agent for polish layers — (— activity) was obtained for h).

[0106] On the other hand, 1g (dry/m2) coating of the anchor coat agent [a Japan Synthetic Rubber Co., Ltd.:epoxy system anchor coat agent] was carried out to one side (corona treatment side) of the base material for polish tapes which consists of a polyethylene terephthalate film [Toyobo Co., Ltd.:corona treatment E5100 type] with a thickness of 75micro by the gravure reversing method (slash version 200 line, 30micro of version **), and the etching primer layer was formed in it. next, the coating agent for the polish layers of the above [top / etching primer layer] (f), (g), or (h) — the each gravure reversing method (the slash version — 95 line) After carrying out 5g (dry/m2) coating and carrying out desiccation heating by 80micro of version **,

polish tape F' (the coating agent for polish layers (f) is used) which has the polish layer of 3micro (dry) thickness, G' (the coating agent for polish layers (g) is used), and H' (the coating agent for polish layers (h) is used) were obtained.
[0107] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.1micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (F) obtained by the above-mentioned approach, (G), (H), (F'), (G'), and (H')] to condensation of an abrasives particle. The center line average relative roughness (Ra) of a polish layer front face was measured with the cut-off value of 0.8mm here by Tokyo Seimitsu Co., Ltd.:surface roughness configuration measurement machine surfboard COM 590A (also setting in the examples 7-13 below the same). Moreover, in the total light transmission of a polish tape (F), the Hayes value had 9% and transparency 91%.
[0108] [Example 7]
polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 30 — weight — the section — mean particle diameter — ten - 15 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — IPA - ST — isopropyl alcohol — a solvent — solid content — 30 — % —] — 70 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (i) — having obtained .
[0109] The coating agent for the polish layers of the manufacturing method above of a polish tape (i) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent (i) to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (I) which has the polish layer of 3micro (dry) thickness was obtained.
[0110] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.2micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (I) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, the total light transmission of a polish tape is 92%. The Hayes value had 10% and transparency.
[0111] [Example 8]
polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 35 — weight — the section — mean particle diameter — ten - 15 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — IPA - ST — isopropyl alcohol — a solvent — solid content — 30 — % —] — 65 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (j) — having obtained .
[0112] The coating agent for the polish layers of the manufacturing method above of a polish tape (j) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (J) which has the polish layer of 3micro (dry) thickness was obtained.
[0113] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.1micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (J) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, the total light transmission of a polish tape is 92%. The Hayes value had 13% and transparency.
[0114] [Example 9]

coating agent silicone varnish [for polish layers — Shin-Etsu Chemical Co., Ltd.: — after adding the colloidal silica sol [Nissan Chemical Industries, Ltd.:ORGANO silica sol IPA-ST, isopropyl alcohol solvent, and 30% of solid content] 200 weight section of mean-particle-diameter 10-15mmicro in KR-220IPA, an isopropyl alcohol solvent, and the solid content 51%]30 weight section, ultrasonic distribution was performed and the coating agent for polish layers (k) was obtained in them.
[0115] The coating agent for the polish layers of the manufacturing method above of a polish tape (k) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (K) which has the polish layer of 3micro (dry) thickness was obtained.

[0116] The center line average relative roughness (Ra) of a polish layer front face was detailed with 0.3micro or less, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (K) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, the polish tape had transparency.
[0117] [Example 10]
polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 20 — weight — the section — mean particle diameter — 70 - 100 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — IPA - ST — isopropyl alcohol — a solvent — solid content — 30 — % —] — 80 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (l) — having obtained .
[0118] The coating agent for the polish layers of the manufacturing method above of a polish tape (l) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (L) which has the polish layer of 3micro (dry) thickness was obtained.
[0119] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.2micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (L) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, in the total light transmittance of a polish tape, the Hayes value had 61% and a translucency 85%.
[0120] [Example 11]
polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 30 — weight — the section — mean particle diameter — 70 - 100 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — isopropyl alcohol — a solvent — solid content — 30 — % —] — 70 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (m) — having obtained .
[0121] The coating agent for the polish layers of the manufacturing method above of a polish tape (m) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of

version **), the polish tape (M) which has the polish layer of 3micro (dry) thickness was obtained.
[0122] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.2micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (M) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, in the total light transmittance of a polish tape, the Hayes value had 68% and a translucency 87%.
[0123] [Example 12]
polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 40 — weight — the section — mean particle diameter — 70 - 100 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — isopropyl alcohol — a solvent — solid content — 30 — % —] — 60 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (n) — having obtained .
[0124] The coating agent for the polish layers of the manufacturing method above of a polish tape (n) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (N) which has the polish layer of 3micro (dry) thickness was obtained.
[0125] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.2micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (N) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, in the total light transmittance of a polish tape, the Hayes value had 46% and a translucency 89%.
[0126] [Example 13]
polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 50 — weight — the section — mean particle diameter — 70 - 100 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — isopropyl alcohol — a solvent — solid content — 30 — % —] — 50 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (o) — having obtained .
[0127] The coating agent for the polish layers of the manufacturing method above of a polish tape (o) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (O) which has the polish layer of 3micro (dry) thickness was obtained.
[0128] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.2micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (O) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, in the total light transmittance of a polish tape, the Hayes value had 20% and transparency 90%.
[0129] The result evaluated by the above-mentioned approach about polish of the whole-line permeability Hayes value of each polish tape (F), (I), (J), (L), (M), (N), and (O), an appearance, and an optical connecter and a property is shown in a table 2 below.

[0130]
[A table 2]

表２　研磨テープの評価結果

	研磨テープ	シリカ 平均粒子径 (mμ)	ＰＶ比 シリカ／結合剤 (重量比)	全光線 透過率 (%)	ヘイズ値 (%)	外観	光コネクタの 研磨特性
実施例　６	Ｆ	１０～１５	８０／２０	９１	９	透　明	○
実施例　７	Ｉ	１０～１５	７０／３０	９２	１０	透　明	○
実施例　８	Ｊ	１０～１５	６５／３５	９２	１３	透　明	○
実施例１０	Ｌ	７０～100	８０／２０	８５	６１	半透明	○
実施例１１	Ｍ	７０～100	７０／３０	８７	６８	半透明	○
実施例１２	Ｎ	７０～100	６０／４０	８９	４６	半透明	○
実施例１３	Ｏ	７０～100	５０／５０	９０	２０	透　明	○

[0131] in addition, the total light transmission (%) and the Hayes value (%) in a table 2 — Suga Test Instruments Co., Ltd. — it measured by :color computer SM-5. Moreover, an optical microscope and Tokyo Seimitsu Co., Ltd. after the polish property of an optical connecter performs the last finishing polish for an optical connecter (zirconia ferrule) using the polish tape of an example article by Elaborate Technical:optical-fiber grinder SFP120A: It is the result of inspecting the existence of a blemish, and the collapse of an optical fiber by three-dimensions surface roughness shape analysis system surfboard COM 590A-3DF.
[0132] the example 1 of a comparison — a line — saturated polyester resin [— Toyobo Co., Ltd.: — in the resin liquid containing the Byron #530]50 weight section, the toluene 70 weight section, and the methyl-ethyl-ketone 70 weight section The WA#10000]200 weight section is added. aluminum-oxide impalpable powder [of mean-particle-diameter 800mmicro — Showa Denko K.K.: — The sand mill was sufficient, and after making it distribute, the coating agent with a viscosity of 100cps for polish layers [p] was obtained by diluting this with the equivalent partially aromatic solvent of toluene and a methyl ethyl ketone.
[0133] with a thickness of 75micro polyethylene terephthalate film [— Toyobo Co., Ltd.: — on one side (corona treatment side) of the base material for polish tapes which consists of corona treatment E5100 type], the 40g (dry/m2) coating and polish tape (P) which stoving is carried out and is an example article of a comparison was obtained for the above-mentioned coating agent for polish layers [p] by the 3 reversing method.
[0134] the example 2 of a comparison — a line — saturated polyester resin [— Toyobo Co., Ltd.: — in the resin liquid containing the Byron #530]30 weight section, the toluene 40 weight section, and the methyl-ethyl-ketone 40 weight section Colloidal silica sol [Nissan Chemical Industries, Ltd. containing colloidal silica of mean-particle-diameter 10-20mmicro : ORGANO silica sol MEK-ST, After adding a methyl-ethyl-ketone solvent and the 30%]400 weight section of solid content, the coating agent with a viscosity of 20cps for polish layers [q] was obtained by diluting this with the equivalent partially aromatic solvent of toluene and a methyl ethyl ketone.
[0135] with a thickness of 75micro polyethylene terephthalate film [— Toyobo Co., Ltd.: — by the gravure reversing method (slash version 95 line, 80micro of version **), 5g (dry/m2) coating of the coating agent for the above-mentioned polish layers [q] was carried out to one side (corona treatment side) of the base material for polish tapes which consists of corona treatment E5100 type], it carried out stoving to it, and the polish tape (Q) which is an example article of a comparison was obtained.
[0136] As a result of performing the last finishing of an optical connecter ferrule end face using the polish tape (P) obtained by the examples 1 and 2 of a comparison, and (Q), a polish blemish

and polish spots arose in the ferrule end-face front face, and the polish property was not good.
[0137] As mentioned above, each polish tape (F) obtained by the above-mentioned approach, (G), (H), The polish layer of (F'), (G'), (H'), (I), (J), (K), (L), (M), (N), and the polish tape of (O) The center line average relative roughness (Ra) of a polish layer front face was set to 0.3micro or less, excluding the big and rough particle (5-10micro) according [all] to condensation of an abrasives particle.
[0138] Moreover, although it had transparency, and the white or the translucency which became cloudy by the particle diameter of the abrasive material particle to be used, or the blending ratio of coal of an abrasive material particle and a binder, the polish property of an optical connecter ferrule end face was altogether good as compared with a polish tape (P) and (Q). That is, when the last finishing of an optical connecter ferrule end face was performed, mirror finish without a polish blemish or polish spots could be performed, and the good optical connecter ferrule of the damping property of a lightwave signal was obtained.
[0139] In addition, it replaced with the optical connecter ferrule and the same last finishing polish test was performed to precision components, such as a semi-conductor wafer, a metal, the ceramics, light filters (for liquid crystal displays etc.), a plasma display, an optical lens, a magnetic disk or an optical disk substrate, the magnetic head, and an optical read head. Consequently, the same result as the case of an optical connecter ferrule was obtained.
[0140]
[Effect of the Invention] Since according to invention according to claim 1 the abrasives particle in a polish layer consists of a very fine particle to which particle diameter with small particle diameter is equal and the big and rough particle (5-10micro) does not exist in a polish layer, the last finishing of precision bill-of-materials sides, such as an optical connecter ferrule and a semi-conductor wafer, etc. can be performed without producing a polish blemish and polish spots.
[0141] Moreover, according to invention according to claim 5, it is suitable to perform the last finishing and the high polish tape of grindability can be obtained easily and certainly.
[0142] According to invention according to claim 8, since the mean particle diameter of the abrasives particle in a polish layer is maintained at 1-200mmicro, a surface blemish can be abolished in case precision components, such as an optical connecter ferrule and a semi-conductor wafer, are ground.
[0143] According to invention according to claim 13, the coating agent containing the abrasives whose mean particle diameter is 1-200mmicro can be obtained.
[0144] According to invention according to claim 17, a suitable polish tape to perform the last finishing can be obtained easily and certainly.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to a suitable polish tape to perform the last finishing over the front face of precision components, such as an optical connecter ferrule, a semi-conductor wafer, a metal, the ceramics, light filters (for liquid crystal displays etc.), a plasma display, an optical lens, a magnetic disk or an optical disk substrate, the magnetic head, and an optical read head, an end face, etc., its manufacture approach, and the coating agent for polish tapes.

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PRIOR ART

[Description of the Prior Art] Polish by which the quality is influenced and is called mechanical polishing to the last finishing polish is performed by the precision in the polish process to which precision components, such as an optical connecter ferrule and a semi-conductor wafer, carry out the last finishing.
[0003] This mechanical polishing is performed as follows. That is, the polish liquid which alkali solutions, such as caustic alkali of sodium, ammonia, and ethanolamine, are made to suspend the abrasives particle which has the particle diameter of 5-300mmicro, and turns into them from the colloidal liquid of pH 9-12 first is produced. Next, precision components, such as an optical connecter ferrule and a semi-conductor wafer, are ground on abrasive cloth, supplying this polish liquid on the abrasive cloth which consists of resin sheets, such as polyurethane.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since according to invention according to claim 1 the abrasives particle in a polish layer consists of a very fine particle to which particle diameter with small particle diameter is equal and the big and rough particle (5-10micro) does not exist in a polish layer, the last finishing of precision bill-of-materials sides, such as an optical connecter ferrule and a semi-conductor wafer, etc. can be performed without producing a polish blemish and polish spots.
[0141] Moreover, according to invention according to claim 5, it is suitable to perform the last finishing and the high polish tape of grindability can be obtained easily and certainly.
[0142] According to invention according to claim 8, since the mean particle diameter of the abrasives particle in a polish layer is maintained at 1-200mmicro, a surface blemish can be abolished in case precision components, such as an optical connecter ferrule and a semi-conductor wafer, are ground.
[0143] According to invention according to claim 13, the coating agent containing the abrasives whose mean particle diameter is 1-200mmicro can be obtained.
[0144] According to invention according to claim 17, a suitable polish tape to perform the last finishing can be obtained easily and certainly.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] There are the following problems in mechanical polishing using above polish liquid and abrasive cloth.
[0005] That is, since the concentration of the abrasives particle in polish liquid changes during polish or the particle size distribution of an abrasives particle change with condensation of an abrasives particle, a polish blemish and polish spots may occur on the ground bodies, such as an optical connecter ferrule and a semi-conductor wafer. Moreover, the process which rinses the abrasives particle adhering to the front face of the ground bodies, such as an optical connecter ferrule and a semi-conductor wafer, and is removed is required after polish termination, and a polish process is complicated.
[0006] On the other hand, it considers forming a polish layer for the coating agent which makes it come to distribute an abrasives particle coating and by drying into the resin liquid for binders (binder) to the base material for polish tapes which consists of a plastic film, and producing a polish tape. Although an optical connecter ferrule, a semi-conductor wafer, etc. are ground on this polish tape, in case a polish tape is produced, it is difficult to make homogeneity distribute an abrasives particle with a particle diameter of 1micro or less in the resin liquid for binders, and it cannot be used as a polish tape for the last finishing.
[0007] That is, although high-degree-of-accuracy polish of the last finishing is performed by polish by the detailed abrasives particle, since surface energy increases and it becomes easy to condense an abrasives particle as particle diameter becomes small, it is difficult to make homogeneity distribute a detailed abrasives particle in a binder.
[0008] Moreover, when a polish layer is formed by the coating agent containing the abrasives particle of a state of aggregation, the big and rough particle (5-10micro) is generating in a polish layer, and generating of the polish blemish of the ground body surface by this is not avoided.
[0009] Without the abrasives particle which this invention be make in consideration of such a point , and consist of a big and rough particle into a polish layer exist , only a detailed abrasives particle be make to exist and it aim at offer the polish tape which can perform precision components mirror finish , such as an optical connecter ferrule end face and a semi-conductor wafer front face , with a sufficient precision , its manufacture approach , and the coating agent for polish tapes .

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MEANS

[Means for Solving the Problem] Invention according to claim 1 is a polish tape characterized by forming a polish layer to the base material for polish tapes by the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders.
[0011] Invention according to claim 5 is the manufacture approach of the polish tape characterized by making the aggregate of an abrasives particle generate in binder resin liquid, considering as the coating agent containing the abrasives particle of particle diameter 100-800mmicro, and subsequently to the base material for polish tapes carrying out coating of this, after distributing the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders.
[0012] Invention according to claim 8 is equipped with the base material for polish tapes, and the polish layer prepared on this base material, and said polish layer is a polish tape characterized by having the binder which combines the abrasives particle and this abrasives particle of mean-particle-diameter 1-200mmicro.
[0013] Invention according to claim 13 is the coating agent equipped with the resin liquid for binders containing the abrasives particle liquid containing the abrasives particle of mean-particle-diameter 1-200mmicro, and the solvent for abrasives particles, and a binder and the solvent for binders in the coating agent for polish tape manufacture.
[0014] The abrasives particle liquid containing the process which invention according to claim 17 prepares the base material for polish tapes, and the abrasives particle of mean-particle-diameter 1-200mmicro and the solvent for abrasives particles, It is the manufacture approach of the polish tape characterized by having the process which mixes the resin liquid for binders containing a binder and the solvent for binders, and produces a coating agent, the process which applies a coating agent on the base material for polish tapes, and the process which dries the applied coating agent.
[0015] Since the polish layer was formed by the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders to the base material for polish tapes according to invention according to claim 1, the particle diameter of the abrasives particle in a polish layer can be made into the very fine particle to which particle diameter was small equal.
[0016] After distributing the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders according to invention according to claim 5, By making the aggregate of an abrasives particle generate in binder resin, considering as the coating agent containing the abrasives particle of particle diameter 50-800mmicro, and carrying out coating of this to the base material for polish tapes The polish tape which has the very fine particle to which particle diameter was small equal in the particle diameter of the abrasives particle in a polish layer can be obtained.
[0017] According to invention according to claim 8, the mean particle diameter of the polish particle in the polish layer prepared on the base material for polish tapes can be maintained at 1-200mmicro.
[0018] According to invention according to claim 13, the coating agent containing the abrasives whose mean particle diameter is 1-200mmicro can be obtained easily.

[0019] According to invention according to claim 17, the polish tape which has a polish layer containing the abrasives whose mean particle diameter is 1-200mmicro can be manufactured.
[0020]
[Embodiment of the Invention]
With reference to a drawing, the gestalt of operation of this invention is explained below the gestalt of the 1st operation. Drawing 1 and drawing 2 are drawings showing the gestalt of operation of the 1st of this invention.
[0021] It is shown in drawing 1 , plate-like precision components 1, for example, semi-conductor wafer. The last finishing polish is performed by the polish tape 10 to such a semi-conductor wafer 1 (refer to drawing 1). In addition, the plate-like semi-conductor wafer 1 serves as a product made from silicon.
[0022] Moreover, as shown in drawing 1 , the polish tape 10 is arranged through the elastomer elastic body 15 on the revolution metal plate 16.
[0023] Next, drawing 2 explains the polish tape 10. As shown in drawing 2 , the polish tape 10 consists of the base material 11 for polish tapes which consists of polyester film etc., an etching primer layer 12 which is prepared on the base material 11 for polish tapes, and uses an epoxy resin, acrylic resin, or polyester resin as a principal component, and a polish layer 13 prepared on the etching primer layer 12. The polish tape 10 may be formed in the shape of a sheet here, and you may form in band-like. Moreover, the above-mentioned etching primer layer 12 is not necessarily needed, and it is prepared in consideration of the adhesive property etc. with the basis 10 for polish tapes, and the raw material which constitutes polish layer 13 grade.
[0024] Among these, the polish layer 13 is formed by applying the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders (resin liquid for binders) on the etching primer layer 12 to the base material 11 for polish tapes. In addition, it is not necessary to necessarily form the etching primer layer 12.
[0025] Moreover, when a polish layer is formed by applying the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro (millimicron) in the resin liquid for binders to the base material 11 for polish tapes, the particle diameter of the abrasives particle in the polish layer 13 serves as 50-800mmicro.
[0026] After facing manufacturing the polish tape 10 and distributing the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders, the aggregate of an abrasives particle is made to generate in these dispersion liquid, and the coating agent containing the abrasives particle of particle diameter 50-800mmicro is produced. Subsequently, the polish tape 10 is manufactured by carrying out coating of this to the base material for polish tapes.
[0027] In the polish tape 10 and its manufacture approach of this invention by the above-mentioned configuration, a silica sol and alumina sol can be used as an abrasives particle of mean-particle-diameter 10-100mmicro.
[0028] If a silica and an alumina with a particle diameter of 1micro or less are distributed in the resin liquid for binders, it is easy to generate a big and rough particle (5-10micro), and the big and rough particle in the polish layer 13 will become a cause, and a polish blemish will come to generate the polish tape 10 which formed the polish layer 13 using this on the ground body.
[0029] On the other hand, if the silica and alumina whose mean particle diameter is 10-100mmicro are distributed in the resin liquid for binders, the polish tape which the above-mentioned big and rough particle (5-10micro) does not generate, and has the polish layer 13 by this coating agent will turn into a suitable polish tape to perform the last finishing of an optical connecter ferrule end face and semi-conductor wafer 1 front face.
[0030] It is suitable to perform the last finishing, and in order to make it the high polish layer 13 of grindability moreover, it is required for the particle diameter of the abrasives particle in the polish layer 13 to be 50-800mmicro.
[0031] The polish layer in the range whose particle diameter of the abrasives particle in the polish layer 13 is 50-800mmicro is obtained by combining the conditions of the following (1) - (2).

[0032] (1) Use the silica and alumina of mean-particle-diameter 10-100mmicro which make the shape of a ball mostly as an abrasives particle at the time of adjusting the coating agent for polish layer 13 formation.

[0033] (2) At the process which is made to distribute an abrasives particle in the resin liquid for binders, and obtains a coating agent, or the process which carries out coating of the coating agent which distributed the abrasives particle in the resin liquid for binders to the base material for polish tapes, grow up condensation of an abrasives particle and make it the abrasives particle of particle diameter 50-800mmicro.

[0034] What is necessary is just to remove a big and rough particle by filtering with a 0.8micro filter, after adjusting pH of the dispersion liquid which made the resin liquid for binders distribute a silica particle to 7-9, stirring gently for several hours and making condensation of a silica particle generate, in order to adjust the particle diameter of the silica particle which the resin liquid for binders was made to distribute to 50-800mmicro.

[0035] Moreover, if what has the silicone resin or silicone system resin which has the frame of Si atom as resin liquid for binders is used, the particle size distribution of the silica particle in the inside of a polish layer become narrow, and can constitute the more desirable polish layer 13.

[0036] Since this has the high compatibility between the silicone resin or silicone system resin used as the resin liquid for binders, and a silica particle, it is presumed to be the coating of the coating agent for polish stratification, and a desiccation process, and to be for also condensing a silica particle, when the resin for binders solidifies.

[0037] The synthetic paper and plastic film which have the property which was excellent in a mechanical strength, dimensional stability, thermal resistance, etc. as mentioned above as a base material 11 for polish tapes with which the polish layer 13 by the above configuration is formed are used, for example, a thing with a thickness [by polyethylene terephthalate, drawing polypropylene, a polycarbonate, acetyl-cellulose diester, acetyl-cellulose triester, drawing polyethylene polybutylene terephthalate, etc.] of about 20-100micro is suitable.

[0038] Since coating was carried out through the etching primer layer and the polish layer 13 was formed using the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders to the base material 11 for polish tapes according to the gestalt of this operation when required, there is no generation of the abrasives particle which consists of a big and rough particle (5-10micro) into the polish layer 13. Moreover, according to the polish tape 10 obtained by doing in this way, the last finishing of an optical connecter ferrule end face and semi-conductor wafer 1 front face can be performed, without producing a polish blemish and polish spots in a ground body surface.

[0039] Moreover, the polish tape 10 which has the polish layer 13 whose particle diameter of an abrasives particle is 50-800mmicro is suitable as a polish tape 10 at the time of performing the last finishing of an optical connecter ferrule end face, semi-conductor wafer 1 front face, etc., and turns into the high polish tape 10 of grindability.

[0040] the gestalt of the 2nd operation — the gestalt of operation of the 2nd of this invention is explained below. The configuration of the polish layer 13 only of the gestalten of the 2nd operation only differing is among the polish tapes 10, and others are the gestalt and abbreviation identitas of the 1st operation.

[0041] That is, the polish tape 10 consists of the base material 11 for polish tapes which consists of polyester film etc., an etching primer layer 12 which is prepared on the base material 11 for polish tapes, and uses an epoxy resin, acrylic resin, or polyester resin as a principal component, and a polish layer 13 prepared on the etching primer layer 12. Moreover, the above-mentioned etching primer layer 12 is not necessarily needed, and it is prepared in consideration of the adhesive property etc. with the basis 10 for polish tapes, and the raw material which constitutes polish layer 13 grade.

[0042] Among these, the polish layer 13 has, the abrasives particle of mean-particle-diameter 1-200mmicro (millimicron), for example, a colloidal silica particle, and the binder which combines this silica particle comrade, for example, organic inorganic compound polymer resin. In this case, organic inorganic compound polymer resin is a high molecular compound which has siloxane association in that structure.

[0043] Thus, since it is distributing without condensing while the colloidal silica particle had maintained mean-particle-diameter 1-200mmicro in the polish layer 13, the total light

transmission of the polish layer 13 is 60 – 95%, and the Hayes value has become 1 – 70%.
[0044] Moreover, although the arithmetical mean deviation of profile (Ra) of polish layer 13 front face is 0.005–0.5micro, in almost all cases, as for close, Ra is within the limits of 0.007–0.2micro.
[0045] Next, the construction material of each component is explained further in full detail.
(1) the monomer which has siloxane association (Si–O association) in the structure as a binder in this invention about the binder in a polish layer, a prepolymer, oligomer, or a polymer — it can be used — for example, a polysiloxane, its derivative, its denaturation object, or its blend object — the monomer, a prepolymer, or oligomer can be used further.
[0046] Specifically not to mention the monomer which constitutes a polysiloxane, a prepolymer, oligomer, or a polymer The monomer, the prepolymer, the oligomer, or the polymer which constitutes this polysiloxane, For example, polyethylene system resin, polyvinyl chloride system resin, polyvinyl acetate system resin, The Pori acrylic or poly methacrylic system resin, polyvinyl alcohol system resin, Ethylene Resin coalesce, polyvinyl-acetal system resin, rubber system resin, polyester system resin, Polyamide system resin, phenol system resin, amino-PURASUTO system resin, an epoxy resin, The monomer, the prepolymer, the oligomer, or the polymer which constitutes polyurethane system resin, cellulose type resin, and other resin can be mixed, and the blend object or a reaction denaturation object can be used.
[0047] It is desirable to use especially the blend object or reaction denaturation object which comes to mix prepolymers, such as polyethylene system resin, polyvinyl chloride system resin, polyvinyl acetate system resin, Pori acrylic resin, polyurethane system resin, and polyester system resin, oligomer or a polymer, and the prepolymer, the oligomer or the polymer of a polysiloxane in this invention.
[0048] If it explains in detail, it will set to this invention. Furthermore, polyethylene system resin, polyvinyl chloride system resin, Polyvinyl acetate system resin, Pori acrylic resin, polyurethane system resin, A prepolymer, oligomer, or polymers, such as polyester system resin, are used as a principal chain. To the side chain, the prepolymer, the oligomer, or the polymer of a polysiloxane For example, it is desirable to use the organic inorganic compound polymer which is made to react by graft polymerization etc., constitutes a principal chain part from organic nature, and comes to constitute a side-chain part from inorganic nature which consists of siloxane association, its prepolymer, or oligomer.
[0049] By **(ing) and using the above organic inorganic compound polymers, the condition of a primary particle can be held without a polish particle condensing in coating material or a polish layer, and it has the advantage referred to as being able to manufacture the polish tape suitable for detailed polish.
[0050] In this invention, why a polish particle can hold the condition of a primary particle as mentioned above If siloxane association (Si–O association) is contained in the resin used as a binder so that it may mention later although it is not certain As an abrasives particle, for example, when a colloidal silica particle is used, When the both will have the functional group which makes Si atom common mutually, both have compatibility and this abrasives particle can hold the condition of a primary particle also in the condition of the constituent as coating material, or the condition of a paint film-like polish layer What can manufacture the polish tape which can carry out polish finishing very good is presumed.
It sets to this invention about a primer layer. (2) As a primer layer For example, polyvinyl chloride system resin, polyvinyl acetate system resin, the Pori acrylic, or poly methacrylic system resin, Polyvinyl alcohol system resin and ethylene Resin coalesce, polyvinyl-acetal system resin, Rubber system resin, polyester system resin, polyamide system resin, phenol system resin, Amino-PURASUTO system resin, epoxy system resin, polyurethane system resin, silicone system resin, It can apply thru/or print and the constituent which makes a kind of the monomer which constitutes cellulose type resin and other resin, a prepolymer, oligomer, or a polymer thru/or more than it the principal component of a vehicle can be formed.
[0051] Furthermore, in order to raise an adhesive property, curing agents, such as isocyanate, may be put in.
(3) In this invention, inorganic compounds, such as an alumina (oxidization aluminum), titanium oxide, a zirconia (zirconium oxide), lithium silicate, a diamond, silicon nitride, silicon carbide,

ferrous oxide, chromic oxide, a silica (silicon oxide), and antimony oxide, can be used as a polish particle, for example about the polish particle in a polish layer.

[0052] It is desirable for the particle diameter to be as desirable as 1 thru/or 300mmicro, and to be only 1 thru/or 200mmicro and to use the thing of the condition of a primary particle for the above-mentioned polish particle from **(ing) and manufacturing the polish sheet suitable for detailed polish in this invention.

[0053] It is most desirable to use a silica (silicon oxide) in this invention, especially, if compatibility with a binder and compatibility are taken into consideration as a polish particle.

[0054] Moreover, if particle diameter uses the thing below 5-50mmicro and the blending ratio of coal (% of the weight) of a polish particle and a binder is further used within the limits of 90:10 to 60:40 as a polish particle in above-mentioned this invention The polish sheet obtained can obtain the polish sheet which total light transmission is [90 - 95% and a haze value] within the limits which is 2 - 15%, and is rich in transparency in comparison, and, as for this polish sheet, it has the finishing polish fitness of the front face of precision components, such as an optical connecter ferrule.

[0055] moreover, as a polish particle, that whose particle diameter is 50-200mmicro is used, and further, when the blending ratio of coal (% of the weight) of a polish particle and a binder is used within the limits of 90:10 to 30:70, the polish sheet obtained serves as a white polish tape which was comparatively alike and became cloudy and which is, carries out and is rich in a translucency, and it has the finishing polish fitness of the front face of precision components, such as an optical connecter ferrule, like the above.

[0056] As a polish particle, the above phenomena are especially remarkable, when using a silica particle. In addition, the surface-finish polish fitness of the polish tape which will be obtained if a polish particle becomes less than a binder in the blending ratio of coal of a polish particle and a binder in this invention is [0057] which tends to fall a little. For example, particle diameter uses the thing below 5-50mmicro, and further, as the blending ratio of coal (% of the weight) of a polish particle and a binder, when the amount of a binder is made [many], the surface-finish polish fitness of the polish tape obtained shows the inclination to fall considerably.

[0058] Although this reason is not certain, since a polish particle is not exposed on a front face into a binder, it is presumed to be what is depended on the ability of polish capacity not to be demonstrated.

[0059] Next, the manufacture approach of the polish tape 10 is explained. First, the base material 11 for polish tapes (50-100micro) is prepared preferably 10-200micro in thickness it is thin from polyester film, for example, biaxial drawing polyethylene terephthalate. Next, if required on the polish tape 10, the etching primer layer 12 which uses an epoxy resin, acrylic resin, or polyester resin as a principal component will be applied. Thus, even if it grinds an optical fiber 2 on the polish tape 10 by applying the etching primer layer 12, the polish layer 13 does not exfoliate from the base material 11 for polish tapes.

[0060] Next, the resin liquid for binders containing the colloidal silica sol (abrasives particle liquid) containing for example, the colloidal silica particle of mean-particle-diameter 1-200mmicro and solvents for abrasives particles, such as isopropyl alcohol, and for example, organic inorganic compound polymer resin (binder) and solvents for binders, such as isopropyl alcohol, is mixed, and a coating agent is produced.

[0061] In this case, it is distributing in a coating agent, without a colloidal silica particle maintaining and condensing mean-particle-diameter 1-200mmicro.

[0062] In addition, the dispersant for mixing organic metal solutions, such as the curing agent for stiffening organic inorganic compound polymer resin, for example, a tin compound etc., into a coating agent, and distributing a colloidal silica particle in a coating agent, for example, a nonionic surface active agent, may be mixed.

[0063] When mixing a curing agent into a coating agent, as for the ratio as a solution of the curing agent to organic inorganic compound polymer resin (solid content), it is desirable that it is 90:10.

[0064] moreover — although it has become the P/V weight ratio in a coating agent, colloidal silica particle (solid content) / organic inorganic compound polymer silicone resin (solid content)

=20:80-95:5 [i.e.,], (weight ratio) — this P/V weight ratio — it is desirable that it is =50:50-80:20.
[0065] Next, a coating agent is applied to the etching primer layer 12 on the base material 11 for polish tapes by the gravure reversing method. After applying a coating agent to the etching primer layer 12 on the base material 11 for polish tapes, grade heating of the base material 11 for polish tapes is promptly carried out for 30 seconds at the temperature of 110 degrees C - 120 degrees C, and solvents, such as isopropyl alcohol in a coating agent, disperse into atmospheric air in the meantime.
[0066] Next, when the curing agent is mixing into a coating agent, the base material 11 for polish tapes is heated for 10 minutes at 80 more degrees C. On the other hand, when the curing agent is not mixing into a coating agent, the base material 11 for polish tapes is heated at 100 degrees C for 1 hour. Thus, a coating agent dries, on the etching primer layer 12, 0.5-10micro in thickness, the polish layer (3-5micro) 13 is formed preferably, and the polish tape 10 is obtained.

[0067] In addition, a colloidal silica particle can be distributed by drying a coating agent on the above conditions, maintaining mean-particle-diameter 1-200mmicro in the polish layer 13 without condensing.
[0068] That is, if solvents, such as isopropyl alcohol, are not dispersed immediately after applying a coating agent, the time amount which a colloidal silica particle condenses in a coating agent will be given, and the mean particle diameter of a colloidal silica particle will become large.
[0069] The colloidal silica particle in a coating agent maintains mean-particle-diameter 1-200mmicro also in which process of a spreading process and a subsequent desiccation process to up to the making process of a coating agent, and the etching primer layer 12 of a coating agent as mentioned above. Moreover, a colloidal silica particle maintains mean-particle-diameter 1-200mmicro in the polish layer 13.
[0070] Thus, the reason a colloidal silica particle maintains the mean-particle-diameter 1-200mmicro is as follows about.
[0071] That is, if a particle with a particle diameter of 1micro or less is generally distributed in the resin liquid for binders, such as polyester widely used as resin liquid for binders, polyester polyurethane, and a vinyl chloride vinyl acetate copolymer, and a coating agent is produced, condensation will become easy to generate a big and rough particle (5-10micro). For this reason, the big and rough particle in a polish layer becomes a cause, and the polish tape which has the polish layer formed using this coating agent makes the ground body generate a blemish.
[0072] On the other hand, the above big and rough particles (5-10micro) do not generate the colloidal silica sol which contains colloidal silica of mean-particle-diameter 1-200mmicro like this invention, and the resin liquid for binders containing organic inorganic compound polymer resin in the coating agent mixed and produced. For this reason, the polish sheet which has the polish layer formed using this coating agent turns into a suitable polish sheet to perform the last finishing of an optical connecter ferrule end face or semi-conductor wafer 1 end face.
[0073] That is, since according to this invention the colloidal silica which is an abrasives particle has the silanol group, it has functional groups, such as polysiloxane oligomer to which the organic inorganic compound polymer resin in another side and resin liquid made Si atom the frame, and this polysiloxane oligomer serves as a functional group with high compatibility to the silanol group, colloidal silica can be distributed in the resin liquid for binders, without condensing. Moreover, since a colloidal silica sol and the resin liquid for binders contain a homogeneous organic solvent in the coating agent which was made to mix the colloidal silica sol which made stability distribute colloidal silica to organic solvents, such as isopropyl alcohol, and the viscous low resin liquid which contains organic solvents, such as isopropyl alcohol, similarly, and was produced, distribution of the colloidal silica to the inside of the resin liquid for binders becomes easy, and generation of condensation of the colloidal silica in the inside of a coating agent can be controlled. As these organic solvents, the methanol [besides isopropyl alcohol], ethanol, xylene butanol, ethylene glycol, and ethylene glycol-mono-n-propyl ether, dimethylacetamide, methyl isobutyl ketone, etc. can be used.
[0074] When the base material 11 for polish tapes, the etching primer layer 12, and polish layers

13 all have transparency in the polish tape 10, since it is hard to attach distinction of a base material side and a polish stratification plane, there is possibility of misuse. What is necessary is just to perform coloring processing or printing processing of an alphabetic character or a pattern to a polish tape base material, in order to prevent this.
[0075] Thus, an optical connecter ferrule end face and the front face of the semi-conductor wafer 1 are ground using the manufactured polish tape. Next, the polish approach of the front face of the optical connecter ferrule 2 is explained.
[0076] As shown in drawing 3 , the polish tape 10 by this invention is arranged through the elastomer elastic body 15 on the revolution metal plate 16, and the front face of the optical connecter ferrule 2 uses water as lubricant on the polish tape 10, and it is ground for about 2 minutes. There is no coarse grain (5-10micro) by condensation in the polish layer 13 of the polish tape 10 as mentioned above, and, for this reason, the front face of the optical connecter ferrule 2 can be ground efficiently.
[0077] Namely, the optical connecter ferrule 2 can be ground with homogeneity and a sufficient precision by making it not make the polish layer 13 of the polish tape 10 produce the coarse grain (5-10micro) by condensation like this invention. Moreover, it is not necessary to supply the polish liquid containing other abrasives during polish, without making the optical connecter ferrule 2 produce a blemish. In addition, when lubricant is supplied depending on the polished body at the time of polishing processing, it may be able to polish still more efficiently. As lubricant, things generally known, such as water, alcohol, a surfactant, and oil, can be used, and the abrasives is not contained in lubricant in this case. When using lubricant, as compared with MENIKA cull polishing which uses the polishing liquid containing an abrasives, handling is easy and workability is good.
[0078] In addition, the polish layer 13 of the polish tape 10 decreases gradually as a whole during polish, without carrying out blinding. For this reason, since the life of the polish tape 10 continues as long as the polish layer 13 exists, the life of the polish tape 10 is maintainable for a long time.
[0079] In addition, the same effectiveness can be done so even if it grinds the precision components of semi-conductor wafer 1 grade instead of the optical connecter ferrule 2.

[Translation done.]

* NOTICES *

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
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EXAMPLE

[Example]
The 1st example, next the 1st example of this invention are explained. This 1st example is equivalent to the gestalt of the 1st operation.
[0081] Hereafter, the concrete configuration of the polish tape of this invention and its manufacture approach is explained based on an example.
[0082] [Example 1]
coating agent moisture powder giant-molecule polyester resin liquid [for polish layers — Toyobo Co., Ltd.: — after adding the aquosity silica sol [Nissan Chemical Industries, Ltd.:Snow tex 30] 10 weight section of mean-particle-diameter 10-20mmicro in the BAIRONARU MD1200]10 weight section, it stirred in it and the coating agent with a viscosity of 100cps for polish layers [a] was obtained in it.
[0083] with a manufacture thickness [of a polish tape] of 50micro polyethylene terephthalate film [— Teijin, Ltd.: — one side of the base material for polish tapes which consists of low heat shrink SG type] — the coating agent for the above-mentioned polish layers [a] — the 3 reversing method — 20g (dry) / m2 The coating and polish tape (A) which it dries and is the example article of this invention was obtained.
[0084] On this polish tape (A), when Hayes which is the last finishing of the front face of a 5-inch silicon wafer was removed, the last finishing without a polish blemish or polish spots was able to be performed.
[0085] [Example 2]
coating agent moisture powder giant-molecule polyester resin liquid [for polish layers — Toyobo Co., Ltd.: — after the organic acid adjusted the mixed liquor of the BAIRONARU MD1200]10 weight section and the aquosity silica sol [Nissan Chemical Industries, Ltd.:Snow tex 30] 10 weight section of mean-particle-diameter 10-20mmicro to pH7.5, the coating agent with a viscosity of 100cps for polish layers [b] was obtained by performing loose stirring of 4 hours and filtering with a 0.8 moremicro filter.
[0086] with a manufacture thickness [of a polish tape] of 50micro polyethylene terephthalate film [— Teijin, Ltd.: — one side of the base material for polish tapes which consists of low heat shrink SG type] — the coating agent for the above-mentioned polish layers [b] — the 3 reversing method — 20g (dry) / m2 The coating and polish tape (B) which it dries and is the example article of this invention was obtained.
[0087] It is clear that have milked the polish layer in a polish tape (B), and condensation of the silica particle in a polish layer has arisen.
[0088] In addition, when the polish layer of a polish tape (B) was observed with the electron microscope, it has checked that the particle diameter of the silica particle in a polish layer was 0.1-0.8micro (100-800mmicro).
[0089] On this polish tape (B), when Hayes which is the last finishing of the front face of a 5-inch silicon wafer was removed, grindability ability 0.1micro or more has been checked.
[0090] [Example 3]
coating agent silicone system coating agent [for polish layers — Japan Synthetic Rubber Co., Ltd.: — the GURASUKA HPC7502]10 weight section — isopropanol silica sol [of mean-particle-

diameter 10-20mmicro — Nissan Chemical Industries, Ltd. — after adding the :IPA-ST]10 weight section, it stirred and the coating agent with a viscosity of 100cps for polish layers [c] was obtained.
[0091] with a manufacture thickness [of a polish tape] of 50micro polyethylene terephthalate film [— Teijin, Ltd.: — one side of the base material for polish tapes which consists of low heat shrink SG type] — the coating agent for the above-mentioned polish layers [c] — the 3 reversing method — 20g (dry) / m2 The coating and polish tape (C) which it dries and is the example article of this invention was obtained.
[0092] On this polish tape (C), when the end face of an optical connecter ferrule was ground, the last finishing which almost has neither a polish blemish nor polish spots was able to be performed.
[0093] with a [example 4] thickness of 50micro polyethylene terephthalate film [— Teijin, Ltd.: — the coating agent for polish layers [c] used for one side of the base material for polish tapes which consists of low heat shrink SG type] in the example 3 — the 3 reversing method — 30g (dry) / m2 The polish tape (D) which has a polish layer with a coating and a thickness of 20micro which it dries and is the example article of this invention was obtained.
[0094] This polish tape (D) could perform mirror finish which has neither a polish blemish nor polish spots when the end face of an optical connecter ferrule is ground, and the good optical connecter ferrule of the damping property of a signal was obtained.
[0095] [Example 5]
coating agent moisture powder system polyester resin liquid [for polish layers — Toyobo Co., Ltd.: — after mixing colloidal silica [the Nissan Chemical Industries, Ltd.:Snow tex 30] of mean-particle-diameter 10-20mmicro to BAIRONARU MD-1245] so that it may be set to polyester resin / silica =1 / 1 (weight ratio), the aqueous ammonia solution was added to it and it adjusted to pH7 at it.
[0096] After stirring this for 2 hours, it filtered with the 0.8micro filter and the coating agent for polish layers [e] was obtained.
[0097] with a manufacture thickness [of a polish tape] of 50micro polyethylene terephthalate film [— Teijin, Ltd.: — one side of the base material for polish tapes which consists of low heat shrink SG type] — the coating agent for the above-mentioned polish layers [e] — the 3 reversing method — 30g (dry) / m2 The coating and polish tape (E) which it dries and is the example article of this invention was obtained.
[0098] This polish tape (E) could perform the last finishing which has neither a polish blemish nor polish spots when the end face of an optical connecter ferrule is ground, and the good optical connecter ferrule of the damping property of a signal was obtained.
[0099] The 2nd example, next 2nd example are explained. This 2nd example is equivalent to the gestalt of the 2nd operation.
[0100] [Example 6]
polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 20 — weight — the section — mean particle diameter — ten - 15 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — IPA - ST — isopropyl alcohol — a solvent — solid content — 30 — % —] — 80 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (f) — having obtained .
[0101] organic inorganic compound polymer silicone resin liquid [— Japan Synthetic Rubber Co., Ltd.: — ceramic coat material GURASUKA HPC7502, a methanol solvent, and the solid content 30%]20 weight section — the colloidal silica sol [Nissan Chemical Industries, Ltd.:ORGANO silica sol IPA-ST, isopropyl alcohol solvent, and 30% of solid content] 80 weight section of mean-particle-diameter 10-15mmicro, and curing agent [— Japan Synthetic Rubber Co., Ltd. — after adding the :HPC404H]2 weight section, ultrasonic distribution was performed and the coating agent for polish layers (g) was obtained.
[0102] Organic inorganic compound polymer silicone resin liquid [Japan Synthetic Rubber Co.,

Ltd. : Ceramic coat material GURASUKA HPC7502, a methanol solvent, In the 30%]20 weight section of solid content, the dispersant [Japan Synthetic Rubber Co., Ltd.:carboxylic-acid system dispersant] 3 weight section, Colloidal silica sol [Nissan Chemical Industries, Ltd. of mean-particle-diameter 10-15mmicro : ORGANO silica sol IPA-ST, isopropyl alcohol solvent, 30%]80 weight section [of solid content], and curing agent [— Japan Synthetic Rubber Co., Ltd. — after adding the :HPC404H]2 weight section, ultrasonic distribution was performed and the coating agent for polish layers (h) was obtained.

[0103] Here, the property of each ingredient of above-mentioned GURASUKA HPC7502, HPC404H, and IPA-ST is shown in the following table.

[0104]

[A table 1]

表　１

グラスカ　ＨＰＣ７５０２	ＨＰＣ４０４Ｈ	ＩＰＡ－ＳＴ
溶　媒　メタノール	溶　媒　イソブタノール	溶　媒　イソプロパノール
固形分　３１％	固形分　１％未満	固形分　３０％
粘　度　４～１６ｃｐｓ	粘　度　２～１５ｃｐｓ	粘　度　３～２０ｃｐｓ

[0105] The coating agent for the polish layers of the manufacturing method above of a polish tape (f), (g), or (h) was filtered by 1micro of filtration accuracies. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — on one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] the above-mentioned coating agent (f), (g), or (h) — the gravure reversing method (the slash version — 95 line) the polish tape (F) which has the polish layer of 3micro (dry) thickness after carrying out coating to 5g (dry/m2) and carrying out stoving to it by 80micro of version ** — (— the coating agent for polish layers (f) — activity) and (G) — (— the coating agent for polish layers (g) — activity) and (H) — (— the coating agent for polish layers — (— activity) was obtained for h).

[0106] On the other hand, 1g (dry/m2) coating of the anchor coat agent [a Japan Synthetic Rubber Co., Ltd.:epoxy system anchor coat agent] was carried out to one side (corona treatment side) of the base material for polish tapes which consists of a polyethylene terephthalate film [Toyobo Co., Ltd.:corona treatment E5100 type] with a thickness of 75micro by the gravure reversing method (slash version 200 line, 30micro of version **), and the etching primer layer was formed in it. next, the coating agent for the polish layers of the above [top / etching primer layer] (f), (g), or (h) — the each gravure reversing method (the slash version — 95 line) After carrying out 5g (dry/m2) coating and carrying out desiccation heating by 80micro of version **, polish tape F' (the coating agent for polish layers (f) is used) which has the polish layer of 3micro (dry) thickness, G' (the coating agent for polish layers (g) is used), and H' (the coating agent for polish layers (h) is used) were obtained.

[0107] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.1micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (F) obtained by the above-mentioned approach, (G), (H), (F'), (G'), and (H')] to condensation of an abrasives particle. The center line average relative roughness (Ra) of a polish layer front face was measured with the cut-off value of 0.8mm here by Tokyo Seimitsu Co., Ltd.:surface roughness configuration measurement machine surfboard COM 590A (also setting in the examples 7-13 below the same). Moreover, in the total light transmission of a polish tape (F), the Hayes value had 9% and transparency 91%.

[0108] [Example 7]

polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 30 — weight — the section — mean particle diameter — ten - 15 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — IPA - ST — isopropyl alcohol — a solvent — solid content — 30 — % —] — 70 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (i) — having obtained .

[0109] The coating agent for the polish layers of the manufacturing method above of a polish tape (i) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent (i) to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (I) which has the polish layer of 3micro (dry) thickness was obtained.

[0110] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.2micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (I) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, the total light transmission of a polish tape is 92%. The Hayes value had 10% and transparency.

[0111] [Example 8]

polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 35 — weight — the section — mean particle diameter — ten - 15 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — IPA - ST — isopropyl alcohol — a solvent — solid content — 30 — % —] — 65 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (j) — having obtained .

[0112] The coating agent for the polish layers of the manufacturing method above of a polish tape (j) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (J) which has the polish layer of 3micro (dry) thickness was obtained.

[0113] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.1micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (J) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, the total light transmission of a polish tape is 92%. The Hayes value had 13% and transparency.

[0114] [Example 9]

coating agent silicone varnish [for polish layers — Shin-Etsu Chemical Co., Ltd.: — after adding the colloidal silica sol [Nissan Chemical Industries, Ltd.:ORGANO silica sol IPA-ST, isopropyl alcohol solvent, and 30% of solid content] 200 weight section of mean-particle-diameter 10-15mmicro in KR-220IPA, an isopropyl alcohol solvent, and the solid content 51%]30 weight section, ultrasonic distribution was performed and the coating agent for polish layers (k) was obtained in them.

[0115] The coating agent for the polish layers of the manufacturing method above of a polish tape (k) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (K) which has the polish layer of 3micro (dry) thickness was obtained.

[0116] The center line average relative roughness (Ra) of a polish layer front face was detailed with 0.3micro or less, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (K) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, the polish tape had transparency.
[0117] [Example 10]
polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 20 — weight — the section — mean particle diameter — 70 - 100 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — IPA - ST — isopropyl alcohol — a solvent — solid content — 30 — % —] — 80 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (l) — having obtained .
[0118] The coating agent for the polish layers of the manufacturing method above of a polish tape (l) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (L) which has the polish layer of 3micro (dry) thickness was obtained.
[0119] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.2micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (L) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, in the total light transmittance of a polish tape, the Hayes value had 61% and a translucency 85%.
[0120] [Example 11]
polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 30 — weight — the section — mean particle diameter — 70 - 100 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — isopropyl alcohol — a solvent — solid content — 30 — % —] — 70 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (m) — having obtained .
[0121] The coating agent for the polish layers of the manufacturing method above of a polish tape (m) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (M) which has the polish layer of 3micro (dry) thickness was obtained.
[0122] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.2micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (M) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, in the total light transmittance of a polish tape, the Hayes value had 68% and a translucency 87%.
[0123] [Example 12]
polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 40 — weight — the section — mean particle diameter — 70 - 100 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a

silica — a sol — isopropyl alcohol — a solvent — solid content — 30 — % —] — 60 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (n) — having obtained .

[0124] The coating agent for the polish layers of the manufacturing method above of a polish tape (n) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (N) which has the polish layer of 3micro (dry) thickness was obtained.

[0125] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.2micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (N) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, in the total light transmittance of a polish tape, the Hayes value had 46% and a translucency 89%.

[0126] [Example 13]

polish — a layer — ** — coating — an agent — organic — inorganic — compound — a polymer — silicone resin — liquid — [— Japan Synthetic Rubber — Co., Ltd. — : — a ceramic coat — material — GURASUKA — HPC — 7502 — a methanol — a solvent — solid content — 30 — % —] — 50 — weight — the section — mean particle diameter — 70 - 100 — m — micro — colloidal silica — a sol — [— Nissan Chemical Industries — Co., Ltd. — : — ORGANO — a silica — a sol — isopropyl alcohol — a solvent — solid content — 30 — % —] — 50 — weight — the section — having added — after — a supersonic wave — distribution — carrying out — the coating agent for polish layers (o) — having obtained .

[0127] The coating agent for the polish layers of the manufacturing method above of a polish tape (o) was filtered by 1micro of filtration ******. next, with a thickness of 75micro polyethylene terephthalate film [— ICI Japan: — after it carried out coating of the above-mentioned coating agent to 5g (dry/m2) and it carried out stoving to one side (easily-adhesive processing side) of the base material for polish tapes which consists of easily-adhesive processing Melinex542 type] by the gravure reversing method (slash version 95 line, 80micro of version **), the polish tape (O) which has the polish layer of 3micro (dry) thickness was obtained.

[0128] The center line average relative roughness (Ra) of a polish layer front face was detailed with about 0.2micro, excluding the big and rough particle (5-10micro) according [the polish layer in the polish tape (O) obtained by the above-mentioned approach] to condensation of an abrasives particle. Moreover, in the total light transmittance of a polish tape, the Hayes value had 20% and transparency 90%.

[0129] The result evaluated by the above-mentioned approach about polish of the whole-line permeability Hayes value of each polish tape (F), (I), (J), (L), (M), (N), and (O), an appearance, and an optical connecter and a property is shown in a table 2 below.

[0130]

[A table 2]

表２　研磨テープの評価結果

	研磨テープ	シリカ 平均粒子径 (mμ)	ＰＶ比 シリカ／結合剤 (重量比)	全光線 透過率 (%)	ヘイズ値 (%)	外 観	光コネクタの 研磨特性
実施例　６	F	１０～１５	８０／２０	９１	９	透　明	○
実施例　７	I	１０～１５	７０／３０	９２	１０	透　明	○
実施例　８	J	１０～１５	６５／３５	９２	１３	透　明	○
実施例１０	L	７０～100	８０／２０	８５	６１	半透明	○
実施例１１	M	７０～100	７０／３０	８７	６８	半透明	○
実施例１２	N	７０～100	６０／４０	８９	４６	半透明	○
実施例１３	O	７０～100	５０／５０	９０	２０	透　明	○

[0131] in addition, the total light transmission (%) and the Hayes value (%) in a table 2 — Suga Test Instruments Co., Ltd. — it measured by :color computer SM-5. Moreover, an optical microscope and Tokyo Seimitsu Co., Ltd. after the polish property of an optical connecter performs the last finishing polish for an optical connecter (zirconia ferrule) using the polish tape of an example article by Elaborate Technical:optical-fiber grinder SFP120A: It is the result of inspecting the existence of a blemish, and the collapse of an optical fiber by three-dimensions surface roughness shape analysis system surfboard COM 590A-3DF.

[0132] the example 1 of a comparison — a line — saturated polyester resin [— Toyobo Co., Ltd.: — in the resin liquid containing the Byron #530]50 weight section, the toluene 70 weight section, and the methyl-ethyl-ketone 70 weight section The WA#10000]200 weight section is added. aluminum-oxide impalpable powder [of mean-particle-diameter 800mmicro — Showa Denko K.K.: — The sand mill was sufficient, and after making it distribute, the coating agent with a viscosity of 100cps for polish layers [p] was obtained by diluting this with the equivalent partially aromatic solvent of toluene and a methyl ethyl ketone.

[0133] with a thickness of 75micro polyethylene terephthalate film [— Toyobo Co., Ltd.: — on one side (corona treatment side) of the base material for polish tapes which consists of corona treatment E5100 type], the 40g (dry/m2) coating and polish tape (P) which stoving is carried out and is an example article of a comparison was obtained for the above-mentioned coating agent for polish layers [p] by the 3 reversing method.

[0134] the example 2 of a comparison — a line — saturated polyester resin [— Toyobo Co., Ltd.: — in the resin liquid containing the Byron #530]30 weight section, the toluene 40 weight section, and the methyl-ethyl-ketone 40 weight section Colloidal silica sol [Nissan Chemical Industries, Ltd. containing colloidal silica of mean-particle-diameter 10-20mmicro : ORGANO silica sol MEK-ST, After adding a methyl-ethyl-ketone solvent and the 30%]400 weight section of solid content, the coating agent with a viscosity of 20cps for polish layers [q] was obtained by diluting this with the equivalent partially aromatic solvent of toluene and a methyl ethyl ketone.

[0135] with a thickness of 75micro polyethylene terephthalate film [— Toyobo Co., Ltd.: — by the gravure reversing method (slash version 95 line, 80micro of version **), 5g (dry/m2) coating of the coating agent for the above-mentioned polish layers [q] was carried out to one side (corona treatment side) of the base material for polish tapes which consists of corona treatment E5100 type], it carried out stoving to it, and the polish tape (Q) which is an example article of a comparison was obtained.

[0136] As a result of performing the last finishing of an optical connecter ferrule end face using the polish tape (P) obtained by the examples 1 and 2 of a comparison, and (Q), a polish blemish and polish spots arose in the ferrule end-face front face, and the polish property was not good.

[0137] As mentioned above, each polish tape (F) obtained by the above-mentioned approach, (G), (H), The polish layer of (F'), (G'), (H'), (I), (J), (K), (L), (M), (N), and the polish tape of (O) The center line average relative roughness (Ra) of a polish layer front face was set to 0.3micro or less, excluding the big and rough particle (5-10micro) according [all] to condensation of an abrasives particle.

[0138] Moreover, although it had transparency, and the white or the translucency which became cloudy by the particle diameter of the abrasive material particle to be used, or the blending ratio of coal of an abrasive material particle and a binder, the polish property of an optical connecter ferrule end face was altogether good as compared with a polish tape (P) and (Q). That is, when the last finishing of an optical connecter ferrule end face was performed, mirror finish without a polish blemish or polish spots could be performed, and the good optical connecter ferrule of the damping property of a lightwave signal was obtained.

[0139] In addition, it replaced with the optical connecter ferrule and the same last finishing polish test was performed to precision components, such as a semi-conductor wafer, a metal, the ceramics, light filters (for liquid crystal displays etc.), a plasma display, an optical lens, a magnetic disk or an optical disk substrate, the magnetic head, and an optical read head. Consequently, the same result as the case of an optical connecter ferrule was obtained.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing showing the polish process using the polish tape by this invention.
[Drawing 2] Drawing showing the lamination of a polish tape.
[Drawing 3] Drawing showing scouring of an optical connecter ferrule.
[Description of Notations]
1 Semi-conductor Wafer
2 Optical Connecter Ferrule
2a End face
3 Optical Fiber
4 Coat Section
10 Polish Tape
11 Base Material for Polish Tapes
12 Etching Primer Layer
13 Polish Layer

[Translation done.]

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CORRECTION OR AMENDMENT

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[Procedure amendment]
[Filing Date] November 19, Heisei 13 (2001. 11.19)
[Procedure amendment 1]
[Document to be Amended] Description
[Item(s) to be Amended] Claim
[Method of Amendment] Modification
[Proposed Amendment]
[Claim(s)]
[Claim 1] The base material for polish tapes,
It has the polish layer prepared on this base material,
The inside of said polish layer is the polish tape characterized by having the binder which combines the abrasives particle and this abrasives particle of mean-particle-diameter 1-200mmicro.
[Claim 2] The base material for polish tapes,
It has the polish layer prepared on this base material,
Said polish layer is formed from the coating agent which distributed the abrasives particle in the resin liquid for binders,
Said coating agent is a polish tape characterized by having the resin liquid for binders containing

the abrasives particle liquid containing the abrasives particle of mean-particle-diameter 1-200mmicro, and the solvent for abrasives particles, and a binder and the solvent for binders.

[Claim 3] As opposed to the base material for polish tapes,

The polish tape characterized by forming a polish layer by the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders.

[Claim 4] An abrasives particle is a polish tape according to claim 1, 2, or 3 characterized by being a silica particle.

[Claim 5] A silica particle is a polish tape according to claim 1, 2, 3, or 4 characterized by being a colloidal silica particle.

[Claim 6] A binder is a polish tape according to claim 1, 2, 3, 4, or 5 characterized by being the binder which has siloxane association.

[Claim 7] A binder is a polish tape according to claim 2, 3, 4, 5, or 6 characterized by having silicone resin or silicone system resin.

[Claim 8] The weight ratio of an abrasives particle and a binder in a coating agent is a polish tape according to claim 2, 3, 4, 5, 6, or 7 characterized by being 20:80-95:5.

[Claim 9] A coating agent is a polish tape according to claim 2, 3, 4, 5, 6, 7, or 8 characterized by having a curing agent for stiffening a binder further.

[Claim 10] A coating agent is a polish tape according to claim 2, 3, 4, 5, 6, 7, 8, or 9 characterized by having a dispersant for distributing an abrasives particle further.

[Claim 11] A polish layer is a polish tape according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 characterized by having a colloidal silica sol containing the colloidal silica particle of mean-particle-diameter 1-200mmicro, and the binder which combines this colloidal silica sol.

[Claim 12] The arithmetical mean deviation of profile of a polish layer front face is a polish tape according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, or 11 characterized by being 0.005-0.5micro.

[Claim 13] It is the polish tape according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, or 12 which the whole-line permeability of a polish layer is 60 - 95%, and is characterized by the Hayes value being 1 - 70%.

[Claim 14] A polish tape given in claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, or 13 characterized by preparing an etching primer layer between the base material for polish tapes, and a polish layer.

[Claim 15] In the coating agent for polish tape manufacture,

The coating agent characterized by having the resin liquid for binders containing the abrasives particle liquid containing the abrasives particle of mean-particle-diameter 1-200mmicro, and the solvent for abrasives particles, and a binder and the solvent for binders.

[Claim 16] The weight ratio of the abrasives particle and binder in a coating agent is a coating agent according to claim 15 characterized by being 20:80-95:5.

[Claim 17] The coating agent according to claim 15 or 16 characterized by having a curing agent for stiffening a binder further.

[Claim 18] The coating agent according to claim 15, 16, or 17 characterized by having a dispersant for distributing an abrasives particle further.

[Claim 19] The process for which the base material for polish tapes is prepared,

The process which mixes the resin liquid for binders containing the abrasives particle liquid containing the abrasives particle of mean-particle-diameter 1-200mmicro, and the solvent for abrasives particles, and a binder and the solvent for binders, and produces a coating agent,

The process which applies a coating agent on the base material for polish tapes,

The manufacture approach of the polish tape characterized by having the process which dries the applied coating agent.

[Claim 20] An abrasives particle is the manufacture approach of the polish tape according to claim 19 characterized by being a silica particle.

[Claim 21] A binder is the manufacture approach of the polish tape according to claim 19 or 20 characterized by being the binder which has siloxane association.

[Claim 22] The process which applies a coating agent is the manufacture approach of the polish tape according to claim 19, 20, or 21 characterized by being carried out by the gravure reversing method.

[Claim 23] The desiccation process of a coating agent is the manufacture approach of the polish tape according to claim 19, 20, 21, or 22 characterized by heating the paint immediately after applying the paint, and having the process which disperses the solvent for abrasives particles and the solvent for binders in the paint.

[Claim 24] The manufacture approach of the polish tape according to claim 19, 20, 21, 22, or 23 characterized by having the process which forms an etching primer layer in the coating agent application side on the base material for polish tapes beforehand.

[Procedure amendment 2]
[Document to be Amended] Description
[Item(s) to be Amended] 0010
[Method of Amendment] Modification
[Proposed Amendment]
[0010]

[Means for Solving the Problem] This invention is a polish tape characterized by forming a polish layer to the base material for polish tapes by the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders.

[Procedure amendment 3]
[Document to be Amended] Description
[Item(s) to be Amended] 0011
[Method of Amendment] Modification
[Proposed Amendment]

[0011] This invention is the manufacture approach of the polish tape characterized by making the aggregate of an abrasives particle generate in binder resin liquid, considering as the coating agent containing the abrasives particle of particle diameter 100-800mmicro, and subsequently to the base material for polish tapes carrying out coating of this, after distributing the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders.

[Procedure amendment 4]
[Document to be Amended] Description
[Item(s) to be Amended] 0012
[Method of Amendment] Modification
[Proposed Amendment]

[0012] This invention is equipped with the base material for polish tapes, and the polish layer prepared on this base material, and said polish layer is a polish tape characterized by having the binder which combines the abrasives particle and this abrasives particle of mean-particle-diameter 1-200mmicro.

[Procedure amendment 5]
[Document to be Amended] Description
[Item(s) to be Amended] 0013
[Method of Amendment] Modification
[Proposed Amendment]

[0013] This invention is the coating agent equipped with the resin liquid for binders containing the abrasives particle liquid containing the abrasives particle of mean-particle-diameter 1-200mmicro, and the solvent for abrasives particles, and a binder and the solvent for binders in the coating agent for polish tape manufacture.

[Procedure amendment 6]
[Document to be Amended] Description
[Item(s) to be Amended] 0014
[Method of Amendment] Modification
[Proposed Amendment]

[0014] The abrasives particle liquid with which this invention contained the process for which the base material for polish tapes is prepared, and the abrasives particle of mean-particle-diameter 1-200mmicro and the solvent for abrasives particles, It is the manufacture approach of the polish tape characterized by having the process which mixes the resin liquid for binders containing a binder and the solvent for binders, and produces a coating agent, the process which applies a coating agent on the base material for polish tapes, and the process which dries the

applied coating agent.
[Procedure amendment 7]
[Document to be Amended] Description
[Item(s) to be Amended] 0015
[Method of Amendment] Modification
[Proposed Amendment]
[0015] Since the polish layer was formed by the coating agent which distributed the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders to the base material for polish tapes according to this invention, the particle diameter of the abrasives particle in a polish layer can be made into the very fine particle to which particle diameter was small equal.
[Procedure amendment 8]
[Document to be Amended] Description
[Item(s) to be Amended] 0016
[Method of Amendment] Modification
[Proposed Amendment]
[0016] After distributing the abrasives particle of mean-particle-diameter 10-100mmicro in the resin liquid for binders according to this invention, the polish tape which has the very fine particle to which particle diameter was small equal in the particle diameter of the abrasives particle in a polish layer can be obtained by making the aggregate of an abrasives particle generate in binder resin, considering as the coating agent containing the abrasives particle of particle diameter 50-800mmicro, and carrying out coating of this to the base material for polish tapes.
[Procedure amendment 9]
[Document to be Amended] Description
[Item(s) to be Amended] 0017
[Method of Amendment] Modification
[Proposed Amendment]
[0017] According to this invention, the mean particle diameter of the polish particle in the polish layer prepared on the base material for polish tapes can be maintained at 1-200mmicro.
[Procedure amendment 10]
[Document to be Amended] Description
[Item(s) to be Amended] 0018
[Method of Amendment] Modification
[Proposed Amendment]
[0018] According to this invention, the coating agent containing the abrasives whose mean particle diameter is 1-200mmicro can be obtained easily.
[Procedure amendment 11]
[Document to be Amended] Description
[Item(s) to be Amended] 0019
[Method of Amendment] Modification
[Proposed Amendment]
[0019] According to this invention, the polish tape which has a polish layer containing the abrasives whose mean particle diameter is 1-200mmicro can be manufactured.
[Procedure amendment 12]
[Document to be Amended] Description
[Item(s) to be Amended] 0140
[Method of Amendment] Modification
[Proposed Amendment]
[0140]
[Effect of the Invention] Since according to this invention the abrasives particle in a polish layer consists of a very fine particle to which particle diameter with small particle diameter is equal and the big and rough particle (5-10micro) does not exist in a polish layer, the last finishing of precision bill-of-materials sides, such as an optical connecter ferrule and a semi-conductor

wafer, etc. can be performed without producing a polish blemish and polish spots.
[Procedure amendment 13]
[Document to be Amended] Description
[Item(s) to be Amended] 0141
[Method of Amendment] Modification
[Proposed Amendment]
[0141] According to this invention, it is suitable to perform the last finishing and, moreover, the high polish tape of grindability can be obtained easily and certainly.
[Procedure amendment 14]
[Document to be Amended] Description
[Item(s) to be Amended] 0142
[Method of Amendment] Modification
[Proposed Amendment]
[0142] According to this invention, since the mean particle diameter of the abrasives particle in a polish layer is maintained at 1−200mmicro, a surface blemish can be abolished in case precision components, such as an optical connecter ferrule and a semi−conductor wafer, are ground.
[Procedure amendment 15]
[Document to be Amended] Description
[Item(s) to be Amended] 0143
[Method of Amendment] Modification
[Proposed Amendment]
[0143] According to this invention, the coating agent containing the abrasives whose mean particle diameter is 1−200mmicro can be obtained.
[Procedure amendment 16]
[Document to be Amended] Description
[Item(s) to be Amended] 0144
[Method of Amendment] Modification
[Proposed Amendment]
[0144] According to this invention, a suitable polish tape to perform the last finishing can be obtained easily and certainly.

[Translation done.]